THE

ELECTRICAL REVIEW.

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ELECTRICAL REVIEW.

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THE PRACTICAL TRAINING OF ENGINEERS.

THE Institution of Civil Engineers has rendered signal service to the engineering industry generally by keeping in view not only the practical side of the engineer's training, but also his general and technical education. From time to time inquiries and conferences have been held under the auspices of the Council, and we have before us a report of the Special Committee appointed by the Council in 1912 to consider the Practical Training of Engineers, this report having been adopted by the Council on July 7th this year. As far back as 1868 an exhaustive inquiry was made by the Institution into the conditions and systems of education in the United Kingdom, and in foreign countries; the results of this inquiry were published in the year 1870. Again, in 1891 another statement was published dealing very fully with the facilities afforded at that time by the engineering schools of universities and colleges within the British Dominions. In the year 1903 the subject was again discussed at an engineering conference of the Institution, and also at the meetings of the Institution of Mechanical Engineers, the Institution of Naval Architects, the North-East Coast Institute of Engineers and Shipbuilders, and other important engineering societies outside London. Very wide differences of opinion were manifested as to the best methods of training engineers, but there was a consensus of opinion throughout the industry that the time had arrived for a thorough investigation of the subject by some body representative of all branches of engineering, whose conclusions would command the attention of all who were interested in the education and training of engineers. This general desire found expression in a letter addressed by the President of the Institution of Mechanical Engineers in May, 1903, to the President of the Institution of Civil Engineers, in which it was stated that the Council of the former considered it desirable that a Committee of the Institution of Civil Engineers should be appointed by the Council to consider and report upon the whole subject of engineering education. The immediate outcome of this letter was the formation of a Committee, which included representatives from practically all the leading engineering societies in the country. The Institution of Electrical Engineers was, on that occasion, represented by the late Mr. R. K. Gray. As a result definite recommendations were made in a report presented by the Committee in 1906, with respect not only to engineering training but also to preparatory education.

It is one of the stock complaints of technical teachers that the youths who come to them for technical instruction are generally so imperfectly grounded in mathematics and other elementary subjects that a considerable amount of time which could more profitably be devoted to specific technical subjects has to be allocated to the teaching of the elements of general education. Without going into much detail, we may summarise the recommendations of the Committee referred to as follows:—It was considered that the standard of education for a boy intended for the engineering profession should be equivalent to that required by the Institution Studentship Examinations, and that his specialised training should not commence until about the age of 17 years. It was desirable also that a leaving examination should be held generally by secondary schools, the standard being equivalent, say, to a matricu-

lation examination of the Universities and Colleges. Advanced history and geography, and essay and précis writing should be included in the ordinary school curriculum, and an introduction to English literature should form part of the English subjects taught. Whilst Latin was considered desirable, Greek was not necessary; but Latin should be discontinued during the last two years of attendance at school. French and German should be taught colloquially, and instruction in mathematics should be given by methods differing considerably from those usually adopted, which appeared to treat the subject merely as a mental exercise. It was particularly urged that the instruction in practical arithmetic should be carried further than had been generally the case hitherto, particularly with the object of encouraging the use of contracted methods, and operations in mental arithmetic. A general knowledge of elementary physics and chemistry should be acquired, and special attention should be given to drawing, including geometrical drawing with orthographic projection, curve drawing, freehand drawing and practical mensuration. Handicrafts such as carpentry or turning, or elementary field surveying, might be encouraged as a recreation, but not as a school exercise.

On the subject of engineering training, the recommendations of the Committee were briefly as follows:—The practical training should be divided into two parts whenever possible, the preliminary stage to consist of at least one year spent in mechanical engineering workshops. [It is important to note this, because there is a wide divergence of opinion as to whether the workshop training should precede or succeed technical college training.] The alternation of college study and practical training, that is to say, the sandwich system, was only feasible when (as in Scotch Universities) the college vacation practically occupied half the year. It was further recommended that at least three to four years should be spent in practical training, including the above-mentioned preliminary workshop course, and that as regards the technical training, facilities for post-graduate work by engineering students should be considerably increased with a view to the encouragement of special research work. Whilst this inquiry was proceeding an inquiry was also conducted by the Association of Technical Institutions as to the co-operation of employers in the technical training of their apprentices, and a comprehensive report was issued in 1905, in which the work at the leading technical institutions and polytechnics was described, and also the nature of the apprenticeship systems in vogue in many of the large engineering works.

These two reports have had an appreciable influence in concentrating attention on the allied subjects of engineering training and the apprenticeship system, and there has been a real attempt in the meantime to take advantage of the various recommendations which were made with a view not only to improving the methods of general and technical education, but also to bringing about some kind of co-operation between employers and technical institutes. The question of apprenticeship is a two-sided one, as it deals, first, with the rank and file, whose ultimate object is to become skilled artisans, and, secondly, with those more highly-educated youths who hope to become professional engineers. It is with the latter that the Institution of Civil Engineers, and, in fact, all the learned engineering societies, are chiefly concerned.

Following up its previous work, the Institution of Civil Engineers held a Conference on the Education and Training of Engineers in June, 1911, under the presidency of Mr. Alexander Siemens, the then president of the Institution of Civil Engineers. This Conference was divided into three sections, dealing with—(1) General Education; (2) Scientific Training; and (3) Practical Training.

Whilst no definite resolution was adopted by the Conference, the trend of opinion was to the effect that the Council of the Institution should use its influence to secure a continuity of study between those public schools where the elements of science are taught and the Universities and Technical Colleges. This would mean that the course of education at the one would begin where that at the other left off, so that a pupil leaving a public school and entering a University or Technical College would not have to start from the beginning and go over most of the ground he had already covered, but would be able to take up at once a specialised course of engineering study.

With a view to facilitate the above it was the view of the Conference that a close connection between the masters who taught science in public schools and the Institution of Civil Engineers was desirable, and that the Council of the Institution should endeavour to induce the Universities and Technical Colleges to adopt such courses of study, say six months during the winter, that the "sandwich" system could be adopted if desired, a system which is not possible with the "terms" now customary. It was also suggested that the Council should endeavour to produce some co-ordination between the colleges and engineering employers so that properly qualified students might be able to get practical training for a period of, say, 24 to 36 months on the sandwich or some other system when vacancies occurred in the works of such employers.

As an outcome of the suggestions of the 1911 Conference a special Committee was appointed by the Council of the Institution of Civil Engineers in 1912 to consider the following questions:—

1. Whether any steps can be taken to define more clearly the conditions of the practical training in the various branches of the engineering profession required by the by-laws.

2. Whether any steps can be taken to establish some co-ordination between engineering colleges and engineers and other employers, so that the practical training of well-educated students may be facilitated.

It will be appreciated that in appointing a Committee of Inquiry the Council took note of the suggestions of the 1911 Conference, and, moreover, gave to the Committee an additional subject for consideration, namely, the question as to the kind of practical training which adequately meets the conditions contemplated by the by-laws. The expression "training" is defined as "opportunities of observing and acquiring some experience of the varied operations incident to the particular branch of engineering pursued, which opportunities should be suitable to the needs of young engineers whose aim is the design and direction of engineering work."

The kind of regular training contemplated by the by-laws is a regular pupilage or apprenticeship by those who do not receive systematic collegiate technical education; or, a full three-year course in good engineering colleges with a shorter period of practical training. But the conditions of apprenticeship are not what they were when the by-laws were formulated, and many youths pass through a works without any written indentures at all. In fact it is shown by the replies to the specific questions put to employers by the Committee that 25 per cent. of the employers do not take pupils or apprentices at all, whilst 25 per cent. of those who are called apprentices are not bound by any indentures or legal agreement.

The period of practical training (which here means either "workshop" training or time served with a consulting engineer) ranges from two to five years, depending upon the nature and extent of the technical training previously received. It is the absence of a written agreement or indentures of apprenticeship, or even a certificate from the employer that a regular course of workshop training has been gone through, which makes it so difficult to form a judgment as to the qualifications of candidates presenting themselves for admission to the Institution.

The report covers over 60 pages of printed matter, and contains so much that is of general interest to engineers that we propose to deal with the evidence presented to, and the conclusions arrived at by, the Committee in a future issue.

South American Trade.

The *Engineering Record* of August 22nd, falling into line with other United States journals, asks "Who will supply South America's needs?" and quotes the views of a number of men said to be thoroughly familiar with South American conditions. Our contemporary says:—"American exporters can accomplish now, literally (*sic*) in a few days, what they could not have done in 50 or 100 years had not this Continental conflict showed the way."

To this, in London, the obvious reply is: "We don't think." And the difficulties that our cousins are going to meet are not ignored by the authorities who contribute to the above-mentioned symposium.

The Argentine Ambassador, for example, points out that it will be necessary for the American manufacturer to change his business methods; he cannot obtain trade by postal circulars—travelling salesmen familiar with the country are indispensable, and tenders should be delivered in person, not through the post. Banking facilities are being arranged, and it is for Americans to supply the ships. Mr. M. A. Oudin, manager of the foreign department of the General Electric Co., U.S.A., draws attention to the economic depression in South America, which has been intensified by the war, and the lessening of the purchasing power of S.A. countries by the partial closing of European markets to their products. The essential elements in the exploitation of manufactures abroad, he says, are representation, price, and quality. "What America is especially weak in abroad is personal representation. The splendid machinery used by England in her foreign trade has been built up during a century. . . . What we need most abroad is American business houses. Until our small manufacturer can sell his goods through such concerns established abroad his business is bound to be more or less intermittent. . . . In the beginning American manufacturers should make up their minds to spend a large amount in investigations of foreign markets. They should expect no return for the first year or two."

Another authority says that all the efforts of the American manufacturers can avail nothing unless they can create a merchant marine quickly, and this point is further emphasised by Dr. E. L. Corthell, a consulting engineer of wide experience in South America, who shows that neither of the countries concerned possesses the necessary deep-sea shipping. The latter also warns his fellow-countrymen that to capture S.A. trade will be no easy task, while another engineer, Mr. Fred. Lavis, takes a very moderate view of the chances of the United States, which has no capital to lend, and will itself be hampered by the loss of European loans.

Mr. Lavis recognises that England will be able to continue manufacturing without great interruption, and that South American countries will limit their purchases to urgent needs.

Since writing the above, it has been brought to our knowledge that the publishers of the *Engineering Record*, and other well-known journals, have set on foot inquiries in South America with a view to ascertaining the requirements of that country, and bringing United States manufacturers into touch with purchasers who formerly obtained their supplies from European sources. One of their circular letters, which we have before us, states that "under ordinary conditions, we would send men to South America to secure first-hand the information that we must have to carry out our plan. The exigency of the situation, however, demands more immediate results than would be obtained in this manner. We have concluded, therefore, to ask for assistance in a limited way from a few men, like yourself, who are acquainted with conditions both in the United States and in South America." The letter goes on to ask for the names and addresses of men who are interested in the electrical industry, and for particulars of the immediate and probable needs for electrical machinery and supplies in the neighbourhood of the addressee. It is clear, therefore, that the United States electrical manufacturers are at the foot of the ladder; they do not know what is wanted by South America, nor are they acquainted with the local conditions, or the men in charge of industrial enterprises. We, on the other hand, are well established there. In Argentina alone we have invested 500 million pounds, and our total exports to that country in 1912, which showed an increase of nearly 10 per cent. over the previous year, were almost equal in value to those of Germany and the United States combined. A British Chamber of Commerce has been established in Buenos Ayres (643, Calle Sarmiento), to which British inquiries can be addressed, and our interests are otherwise well represented.

We think our electrical manufacturers need not have a moment's uneasiness with regard to the future of their trade with South America; the odds are all in their favour. Even if the United States were able to secure half of Germany's trade with that continent, the other half would be a prize well worth our capture, but so great are the difficulties in the way, that our only present rival will find the task a very arduous one, which, moreover, far from being mastered in a few days, will take years to accomplish. We are there already; and if our campaign is well conducted, and the purchasing power of South American countries improves, the diversion of the trade to our workshops ought to prove an easy process. But it will not merely "happen"; energetic and sustained action is necessary on our part, and no time should be lost in commencing the attack.

The Lead Position.

The lead market has become rather quieter with less pressure of inquiry from Russia. Russian buying has been of the greatest assistance to the market for some weeks, and the time when shipments to our great northern ally are rendered impossible because of the stoppage of navigation in the Arctic port of Archangel (which is the enforced destination of the goods being sent into the country through the practical closing of the Baltic by Germany) is awaited with some anxiety. It is much feared that the cessation of shipments of lead to Russia would have a bad influence upon selling prices of lead, but this remains to be seen. The restriction of production at the mines and smelters in Spain, and particularly in Australia, is bound to be of prime importance upon the position sooner or later, but it is doubtful whether output or consumption has suffered the more severely since war broke out. In Australia there has been some resumption of work at properties which had been stopped entirely, and the directors of the Zinc Corporation have now intimated officially that an arrangement has been made with the Broken Hill Prop. Co., to smelt a reduced tonnage of leady concentrates from the corporation's lead mill. It is estimated that this will enable the corporation to keep the lead mill running half-time, and operations on this basis will be resumed on November 2nd. The arrangement appears to have been dictated not by reason of any belief that the world wants the lead thus to be produced, but to give employment to labour on the spot. Meantime, there has been a steady and regular quantity of lead coming forward from overseas, and America is quite a ready seller. There is no doubt that in the United States financial conditions have been, and still are, difficult, and that the desire to turn lead into gold exists in full measure. This is not to be wondered at, but equally so the downward tendency of prices during the past six weeks contains nothing which need cause surprise. The general home trade is very poor, though here and there the rollers report that they are doing a trifle more than they were in sheets and pipes, but there is a great deal of leeway to be picked up, and the complete restoration of industrial activity is far ahead at present. The situation of lead in common with that of most metals, and many other commodities, hangs largely upon the developments in France and Belgium. If it so happened that the Allied forces could wrest a decisive victory from their foes, then all business here would improve, for the market is really dependent to an abnormal extent upon sentiment. Hence it is that the progress of the military operations is being watched with tense anxiety. That we and our Allies can possibly fail in the end is not a matter for speculation, for we all know that Germany is doomed, but we want a definite lead now, before trade and finance will begin to take the forward path again. The main consumptive demand comes still from Government contractors, and the mere peace uses of the metal occupy a secondary position. There cannot be any alteration in this respect until the war news frees some of the clogged wheels of trade. So far as supplies are concerned the American position is uncomfortable, but there is an idea in well-informed channels that prices across the Atlantic are near the bottom, and that the reduction there has really been partly forced to compel producers to restrict.

U.S.A. SAFETY RULES FOR THE OPERATION OF ELECTRICAL EQUIPMENT AND LINES.*

The growth of Compensation Laws in the United States has emphasised the necessity for the adoption of safety rules for the electrical industry as well as for other industries. As each State makes its own laws, there is no legislation corresponding to our Factory Acts or Electric Lighting Acts, and there are no Government Departments equivalent to our Home Office or Board of Trade to make or enforce safety regulations throughout the States as a whole. As regards the electrical industry, only one State has at present adopted any safety rules.

Under a special authorisation by Congress, the National Bureau of Standards has recently been conducting an investigation of life and property hazards and a study of safe operating practices and safe methods of working in regard to electrical equipment and lines.

The necessity for such an investigation is evident from the fact that in the year 1913 there were no fewer than 450 fatal electrical accidents. The inquiry has been very thoroughly carried out by the engineers of the National Bureau. Several of the States have independently formed commissions to inquire into the subject. The Bureau of Standards has conferred with these commissions, and has consulted both company officials and employés. Analysis of the available electrical accident data has shown a large proportion of accidents to be preventable by the observance of definite operating precautions. Both practice and results have been found to vary widely in different localities, and hence local opinion and custom are not a sufficient guide for commissions and companies desirous of securing adequate protection. Rules having their source entirely in local experience or in casual exchange of experiences are liable to be open to the objection that precautions are prescribed to prevent a particular class of accident only after such an accident has occurred. They may thus permit the occurrence of accidents which might be avoided by the observance of rules proceeding from a broader study and experience. Thousands of the smaller companies, in the absence of sufficient data and experience to prepare rules, have no printed rules in effect.

After careful comparison and analysis of existing sets of rules, the Bureau of Standards has drawn up and now offers for criticism and discussion a code of rules which it is suggested should be adopted generally throughout the States. It is pointed out that each rule has been subjected to careful scrutiny, and that the needs of the class of workers to which any rule is addressed have been kept constantly in mind and the workers of this class freely consulted. The resulting code of rules deals entirely with the question of safeguarding operation; it does not include the equally important aspect of the subject—the construction and protection of the apparatus and conductors which have to be operated. At first sight this may appear to be putting the cart before the horse. Investigation of electrical accidents in this country, as shown in the annual reports of the Chief Inspector of Factories, shows that at least as many accidents are due to the absence of proper protection of apparatus and conductors or to faulty design as to neglect of proper care in working. It is obvious, however, that the more dangerous the apparatus and arrangement of conductors, the more necessity there will be for safety rules as to their operation.

It is some years since the writer of this article visited the States, but at that time it was very evident, and it is even now admitted by Americans, that the matter of protection of apparatus and conductors with a view to safeguarding the attendants and other persons employed has been very much neglected, and the standard of safety is generally very much lower than in this country. In Canada also it is no better. As an example, the writer recently received from a young electrical engineer of his acquaintance who had gone to Canada, a letter giving an account of some of his experiences. He had obtained work with an electricity supply company in a fairly large town. On the second day he was there a man was killed by electric shock, but of this he gave no details. He himself received a bad shock a few days later from an unearthed switch-box. The description of the conditions under which he was working at the time of writing shows an amazing disregard for safety on the part of the company. His job consisted of cutting up and tapping metal conduit at a bench placed in a room used as a workshop at the back of a 10,000-volt switchboard with bare and entirely unprotected conductors within six feet of the vice at which he had to work! No amount of "operating" rules could be of any use for ensuring safety when such conditions as this are permitted. The actual use of a high-tension switchboard chamber as a workshop, as in this case, may be of exceptional occurrence, but reports from engineers visiting both the States and Canada show that unnecessary exposure of conductors and apparatus is very much more general than in this country. Whilst having no desire to minimise the value of carefully considered operating rules, it appears to the writer that the value of such rules in reducing the number of accidents must be largely discounted if at the same time there are no regulations in reference to the protection of conductors and apparatus. It is much more effective to screen off conductors where practicable so that they cannot be accidentally touched than to tell persons who have to pass or work near them that they must not touch them or go within a certain prescribed distance.

It is satisfactory, however, to note that the Bureau of Standards is not neglecting the other side of the question, and that rules for construction, installation and maintenance of electrical equipment to safeguard employés and the public are in course of preparation. Such rules should naturally come before operating rules, but as they no doubt are more difficult to frame, and as a considerable time must necessarily elapse after they are issued before they can be effectually complied with, the decision of the Bureau of Standards to issue the operating rules which can be adopted without delay, and without waiting for the completion of the structural rules, is no doubt the best in the circumstances.

The scope of the rules includes all operation on or about generating stations, sub-stations, private plants, power lines, signal lines, tunnels and subways, and testing departments. The rules are divided into three sections. The first comprises rules applicable to the employer, the second general rules applying to the employé, and the third special rules for the employé according to the class of work he is engaged upon. The rules for the employer deal firstly with organisation, and provide that each employé shall be furnished with a copy of the rules, and with an organisation diagram showing the division of responsibility between the several classes of employés, the names and addresses of the physicians and members of the organisation who are to be called upon in emergencies, and a copy of rules for first aid, resuscitation and fire extinguishment. Similar diagrams, lists and rules are required to be posted in stations, testing rooms and line wagons. A properly qualified chief operator is to be directly responsible to the management for the safe conduct of all operations. A properly qualified foreman is to be in charge locally where any work is done if two or more men are engaged. The employer has to provide in electrical stations a sufficient supply of first-aid and fire-extinguishing devices, including

* U.S.A. Department of Commerce. Circular of the Bureau of tandards, No. 49.

first-aid outfits, insulating gloves, sleeves, boots, shields, covers, mats and platforms, protective goggles with insulating frames, insulating rods and tongs, electroscopes, insulating tools, "men-at-work" tags, fire-extinguishing appliances, &c., &c. Report sheets for the reporting of accidents with all necessary particulars are also to be provided. A further rule deals with the arrangement and marking of equipment and lines for the purpose of ready identification.

There is little in these requirements which would not as a matter of course be provided for in the case of any of the larger undertakings in this country. Two of the rules are, however, specially noteworthy. One requires that employés shall be thoroughly and regularly drilled in approved methods of first-aid, resuscitation, and fire-extinguishment. This is an excellent requirement, and might with advantage be more generally adopted in electrical stations and other works in this country. Although directions for first-aid in case of electric shock are required by the Factory Act Regulations to be posted in all electrical works, there is no requirement as to drilling and practice in the methods, and although first-aid and fire-extinguishing appliances are in many instances provided in addition, there is seldom sufficient instruction or practice in their use. When the emergency for which they are intended arises, their provision is apt to prove ineffectual because the employés are not immediately able to put them to the best use.

The other noteworthy rule deals with the qualifications of employés. It provides that each employé must be qualified for the work he has to perform. This elementary requirement has its counterpart in both the Factory and Mines Acts Regulations in this country, but the rule goes beyond this and requires that the employé shall be given his authorisation only after he has demonstrated his fitness for that kind of work by examination, and further that he shall be instructed in the application of the rules to his work, and that he shall be periodically examined in order to determine his continued fitness for work and his knowledge of the safety rules. It does not appear who is to conduct the examination. In the larger undertakings the trained technical staff would no doubt be able to examine the employés of the lower grades. In other cases difficulties would arise unless diplomas from technical colleges or other educational bodies could be accepted, but in such cases the examinations would have to be of a specially practical nature to meet the requirements for the particular classes of work. Neither the Factory nor the Mines Regulations in this country specify any such examination of the employé, though no doubt it would be a useful provision if practicable to enforce.* The Institution of Electrical Engineers has recently introduced an examination for admission to the class of Associate Membership, and the Association of Mining Electrical Engineers grants certificates after examination, but this is purely voluntary. These examinations may ultimately prove of great service to employers in this country in selecting men for the more important posts, and incidentally may raise the status of the electrical engineer-in-charge, but such examinations would hardly meet the case of the workman who has to prove his competency in any particular branch of work.

One more important provision is included in this rule. It is that no employé shall be permitted to work unless he be in a competent mental and physical condition and uses neither intoxicants nor drugs. This again is no doubt an excellent provision in theory, but would be extremely difficult to enforce in practice. Even if the prohibition of intoxicants and drugs is practicable, how is the employer to ensure that each employé is every day and all day in a competent mental and physical condition? A daily medical examination would be impracticable. The employés might certainly be instructed that they must not come to work if they are feeling not quite up to the mark, but in such a case they would expect to receive their pay just the same, or at any rate, say, half-pay. This would inevitably lead to a considerable portion of the staff taking days off whenever they felt disinclined for work, and would seriously interfere with the smooth working of the undertaking. The question would have to take into account the hours of work. Emergencies sometimes arise when employés may have to work "all round the clock." It is at such times that a man requires all his wits, and yet as the hours run on his mental and physical condition are apt to deteriorate accordingly. Overtime, even in emergencies, would therefore have to be curtailed or prohibited.

(To be concluded.)

* In New South Wales there is a Government examination for mining electricians.

THE OTHER WAR.

[COMMUNICATED.]

Without any intention of dogmatising one may try to ascertain the reasons of German commercial success, and the lines upon which this other war, to be successful, must be conducted. A few selections from the columns of the Review will suffice as a take-off. In the issue of October 9th, on page 486 (column 2), in the Ceylon paragraph, it is stated:—"There is no doubt that the success of German trade in this Colony has been due to the comparative cheapness of the goods when compared with similar articles of British make. In the whole of the East cheapness is the main consideration of the purchaser," etc.

On the same page under France: "The consensus of opinion is that the success of German manufacturers in France is largely due to the fact that their goods appeal to the masses, while English makers only consider the better class buyers, who are far less numerous."

On page 487 (column 1) Portugal: "High prices in Portugal, due to protection, cause a demand for cheap manufactures, and excessive production in Germany, permitted a lowering of prices for surplus supplies."

One might augment this list, but let it suffice to show that there is abundance of such impartial first-hand evidence that, first and foremost, German goods are cheaper than British, and the East is not the only locality wherein cheapness is of primary importance. Maybe some of our manufacturers can account for that difference in price. In passing, however, it is significant to note that "Germany has surplus supplies" to sell in Portugal. Excessive production is not a malady from which, as yet, many British electrical firms have suffered. Not twenty miles away from the writer is an English works, built to manufacture electrical goods, only dating from the last decade, and now being used as a gaol for German prisoners. Within the same radius, but in another direction, is a disused watch factory serving as a barracks for a newly-enlisted battalion of "Pals."

"Under-production" shut up these two factories, and Portugal buys Germany's surplus. On the face of it one might suppose that Britain also buys her share of that surplus.

When the German trader sends his representative out with an initial advantage in price he has already half won the battle. Further, it is said, that we are not so ready to send our agents abroad as are our rivals. The British firms who will reap the benefit first in the new situation are doubtless just those firms who have already, for some time, had agencies in various parts of the world. To secure reliable and competent agents on the spot takes time, and to send such out takes more time. Time in this trade war is equally precious as it is to the enemy's legions on the Continent. The Colonies are in the market for goods, the Scandinavian neutrals are without their usual German supplies, and the Latin countries also. They cannot wait until our agencies are fitted up; to-day is the day, to-morrow may be too late.

In this connection may be mentioned the chief conditions and terms upon which goods are sold in sundry countries in those areas at present partly accessible for business purposes. In Norway and Sweden it is usual to quote c.i.f. Scandinavian port, prices to be in local coinage, and to include 2½ per cent. commission for the agent, and quotations in the metric system. Payment is secured by the agent, who remits after deducting commission, but time of payment is somewhat longer than the English "monthly account." The same applies also to Spain, except that in rare cases it is possible to obtain cash against documents. The seller, of course, pays all insurance charges as far as the foreign port. In normal times it is

difficult to compete in the Scandinavian markets; in Spain almost impossible at anything like remunerative rates. With regard to Egypt and our African colonies, as well as Australia, conditions are most favourable, and business is more frequent. Manufacturers can obtain better terms, and ship f.o.b. English port, often for cash against documents from London agents of the buyers.

Generally, the ordinary home prices, and certainly ring prices, are too high for export orders, but some British firms have evidently yet to learn that half a loaf is, in this case, better than no bread. To cut prices is not always easy; to cut in quality, weight or design is more practicable. Bare copper wire is an instance, however, where no modification is possible. An electric motor can be altered to suit the market, and many other articles, in fact the majority, belong to the latter category rather than to the former.

To come nearer home, however, there is the problem of the British market to consider. Though a steady oversea trade is a great asset for any manufacturer, few will dissent from the view that the primary consideration should be for the home market. America, Germany ,and other foreign manufacturing countries, large and small, are unanimous upon this point. A recent correspondent has truly remarked that in general a 15 per cent. difference in price nullified an enormous amount of patriotism at home, and that if the difference is still there, after the war has passed, things will return to the *status quo*. If it be true, for instance, and we believe it is so, that Germany can sell cables 10 per cent. cheaper than our cost price, we shall realise the necessity of looking to our laurels at home before worrying unduly about the export trade. No time or trouble can be spared, no effort must be neglected, in perfecting all our organisations for the peaceful warfare which has to be waged in order to put British trade on a footing upon which it will have a better chance of success that it has had of late. The method may be this or that, but it must be no half measure, no *laissez faire*, or from the outset we shall be handicapped fatally, and our defeat will be sure if not quick.

THE ELECTRICAL TRADES AND THE WAR.

(*Continued from page* 553.)

Robt. W. Paul.

1. I have plenty of orders in hand from home, Eastern and American markets, and overtime has been necessary since the outbreak of war.

2. The difficulty of obtaining highly skilled labour has long been considerable, and is now not greater than before.

3. The flow of new orders is well maintained and is above the average.

4. Except in the case of the United States, I am not aware of any considerable diversion of orders to me for goods previously supplied from Germany. Continental competition in high-class scientific electrical instruments has never been serious in the home market, and the absence of orders from Germany and Austria will probably be balanced by increased orders from Russia, India and the British Colonies.

5. The temporary difficulty of obtaining certain materials, which occurred during August, no longer exists.

6. The acceptance of home orders is not affected by existing financial conditions. In the case of overseas trade there are occasional difficulties with respect to payments, and in this matter unified action on the part of the trade would be welcomed.

7. I have, so far, not found it necessary or advisable to introduce instruments formerly supplied only from the Continent. I have received numerous requests from agents to produce copies of Continental instruments, but have declined these proposals in the belief that it is inadvisable to perpetuate these types while equivalent or superior English patterns exist. English manufacturers of magnetos, magnets and other apparatus have, however, been supplied with testing apparatus which were not previously required. I have for a long time studied the catalogues of Continental instrument makers, and gradually extended my line of manufactures, so that it already covers practically all requirements for electrical measurement, testing or research; I have no present intention of departing from my policy of specialisation in this direction, since I have ample field for work along existing lines.

British Insulated and Helsby Cables, Ltd.

We have pleasure in informing you that we have sufficient orders in hand to keep our works fully employed, some of the departments indeed being engaged day and night, and owing to the latter condition of things, coupled with the fact that a number of our employés have been taken away for military service, we have some little difficulty in obtaining an adequate supply of labour.

We are glad to say that new orders appear to be coming in satisfactorily, and we have been able to secure some of the business which has hitherto been placed in Germany by neutral countries.

With rare exceptions, the supply of raw material is sufficient for our requirements.

Generally speaking, the financial conditions are such as to enable us to accept British orders freely, but considerable caution is necessary in dealing with orders from abroad.

St. Helens Cable and Rubber Co., Ltd.

Replies to questions 1-6 are generally similar to the foregoing:—

7. We are considerably extending lines of manufacture formerly dealt with principally by Continental firms, such as ebonite, but although frequently invited we will not lower the quality of our manufactures to take the place of Continental cables, &c., which previously had a large sale among short-sighted and unpatriotic buyers in this country.

The Wardle Engineering Co., Ltd.

We have so far felt no ill-effects from the war. August is always a quiet month owing to the holidays, and trade was already on the decline, but we were surprised to find it quite good. In September, and so far this month, we have been exceedingly busy, in fact, so far the value of orders received creates a record for the period of the year. We account for this in two ways: First, we are obtaining orders which have previously gone to the Continent (and there must have been many); and secondly, the shortage of carbons has necessitated the use of metallic-filament lamps in the place of arc lamps. On the other hand, half-watt lamps are scarce, and deliveries bad, and in addition the reduction of street and shop lighting in London and on the East Coast is certainly a disadvantage. Continental business seems to be developing, and we are making every effort to capture it. We have had inquiries from all over the Continent, including Warsaw. Business from the Colonies, however, seems to be slack.

With regard to raw materials, sheet zinc is almost unobtainable, though fortunately we had a fair stock before the war commenced, and we are substituting aluminium, copper, and other metals, in cases where it is unobtainable. We are, of course, endeavouring to fulfil the requirements previously supplied from the Continent, although we cannot get down to their prices, especially in view of the increased cost of raw materials.

A Large Manufacturing Firm.

1. We have sufficient orders in hand to keep our works fully employed.

2. We have been able to replace a certain proportion of the employés of the company who have joined the Colours. There is apparently not much difficulty in obtaining a further supply of labour, but the billeting of large bodies of troops on the town makes it hard for workmen brought from other towns to find accommodation.

3. New orders are coming in at a satisfactory rate.

4. A certain amount of business which we are securing, both at home and abroad and in the Colonies, undoubtedly formerly went to Continental firms.

5. Generally speaking, the supply of raw material is sufficient.

6. Financial conditions do not prevent our accepting orders freely.

7. The amount of work in hand makes it difficult for us to undertake any new lines of manufacture at the present time.

On the Continent and elsewhere we are offered orders for machinery which had been placed with German and Austrian firms before the war, but in many cases we are asked to allow payments to be spread over several years.

English manufacturers are not bankers, nor are they controlled by groups of financial institutions with funds available for this class of work. If, after the war is concluded, the Continental manufacturers still find themselves in a position to continue to do business on the lines of extended terms of payment, then, in our opinion, some effort must be made by British manufacturers to put themselves into a position to undertake business on similar lines. The suggestion often made, of the establishment of an industrial bank, might be a solution, but British bankers are so conservative, that manufacturers will probably have to fall back upon the alternative of finding the necessary capital themselves.

The Crypto Electrical Co.

We are pleased to inform you that we have more than sufficient orders to keep our works fully employed, but at present, owing to our having lost a considerable number of men who have gone to the war, we are having difficulty in getting enough labour to turn out the machines for which we are getting orders.

New orders are also coming in on the whole at a rate exceeding the average, and we believe that a good deal of the business we are now getting is for machines which have previously been supplied by German firms, but, of course, it is a difficult matter in many cases to prove this; but we know for a fact that we have several orders in hand which otherwise would have gone abroad, and this is particularly the case with regard to orders we are getting from the Colonies.

We are having very little trouble with regard to the supply of raw material, but the prices, of course, are somewhat higher, although deliveries are not as bad as one might expect.

We are accepting all orders we can possibly get, and are refusing none on account of financial reasons.

We are starting a few lines of special machines to take the place of those which have been supplied exclusively from Continental firms previously.

We are also receiving a large number of orders for transformers, &c., for cinematograph work, which is rather surprising, as it seems to us to indicate a very optimistic spirit, as we should have imagined that a cinematograph show would have been one of the first to have suffered from the war.

Of course we are very busy with Admiralty and War Office works, and deliveries in these cases have to be made very promptly, which necessitates a fair amount of overtime.

Langdon-Davies Motor Co.

We are able to reply favourably to the seven questions which you ask us, and we find trade gradually improving. We are contemplating starting new lines formerly manufactured by the Germans, in the near future.

A Firm of "Allied Manufacturers."

Our works are very fairly employed, bearing in mind that over 20 per cent. of our total male staff are on active service.

New orders, of the kind normal prior to the war, come in more slowly, many prospective purchasers suspending extensions and other developments involving purchase of machinery.

The supply of raw materials, speaking broadly, has not been seriously affected by the war.

The financial conditions prevailing are a handicap to extended business, especially where fresh municipal loans are necessary for fresh purchases.

Igranic Electric Co., Ltd.

Like most other people, we anticipated considerable disturbance from the war; but, as a matter of fact, we have sufficient orders in hand to keep our staff fully employed.

Although many of our men have joined the Colours, and at first we had some difficulty on account of new employés' lack of special experience, yet, owing to having a sufficient number of the old hands remaining, we have overcome the difficulties in this direction.

New orders are coming in at an encouraging rate, and prospects are improving.

We have not experienced any serious difficulties in obtaining raw materials, and financial conditions appear to be sound, and have not interfered with our acceptance of orders.

Manufacturers of Accessories.

1. A fair number of orders in hand, but less than the average for this time of year.
2. Have not so far experienced any difficulty *re* supply of labour.
3. New orders are less than the average for this period of the year, but a few inquiries are near settlement.
4. Cannot trace any new business. The few inquiries so far received have been for flimsy stuff at prices previously declined. We could only accept such at a financial loss and also loss of prestige.
5. Have had little difficulty *re* supply of raw materials, except a few lines which will ultimately be displaced by British manufacture.
6. The financial conditions are now much easier, and we are able to accept orders within our usual scope.
7. None so far. We should like to mention that firms when inquiring for prices have stated that their supplies from the Continent have been curtailed for the present; presumably their ideas on the matter are to purchase from Great Britain as a temporary stop-gap, and return to their old suppliers when the chance occurs.

(To be continued.)

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

New Street Lighting Fitting.

The B.T.H. Co. has just introduced a new lighting fitting with the polar distribution curve shown in fig. 3 herewith.

As shown in the sectional elevation, fig. 2, the lantern consists of heavy copper spinnings secured to an internal mild-steel spider, to which the lampholder is also attached. It is so arranged that by the removal of one nut the upper spinnings can be detached, giving free access to the holder, &c., for wiring. The spider also forms a gallery, which holds the reflector in the correct position relative to the lamp.

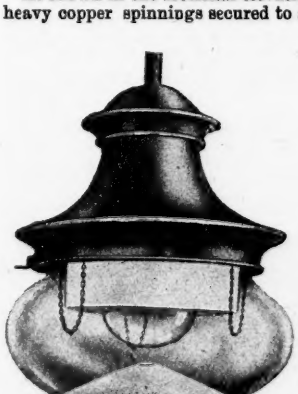


Fig. 1.—B.T.H. Patent Street Lighting Unit.

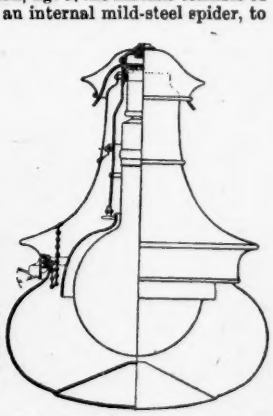


Fig. 2.—Section Showing Internal Construction.

The globe is secured to a copper ring by means of clips held in position by screws, and this ring in turn is secured to the lantern frame by three spring latches of a special type, so that the globe may be easily removed or inserted, and at the same time is quite secure when in position.

Owing to the special form of construction, whereby the top spinning can be removed when the lantern is in position (either on a chain or attached to a bracket), easy access is gained to the interior for wiring. When not connected to a rigid tube it is intended that the leads should be carried in beneath the detachable spinning, which obviates the necessity of employing a weatherproof hood, with the attendant difficulties of wiring, &c.

It will be noted that the fitting embodies an upper reflector and a lower deflector, and it is the combination of these two which produces the desired distribution. The function of the deflector is to deflect the rays which would fall within a zone of 0 to 50° from the vertical, and turn them into a direction of about 15° from the horizontal.

The fitting is especially applicable to half-watt lamps which, from the shape of the filament, give a large portion of their candle-power in a downward direction. The fitting is also supplied either for single Mazda lamps of the standard type or for clusters of from three to seven smaller Mazda lamps. The standard finish of the lantern is black stove enamel, but other coloured enamels or polished copper finish can be supplied.

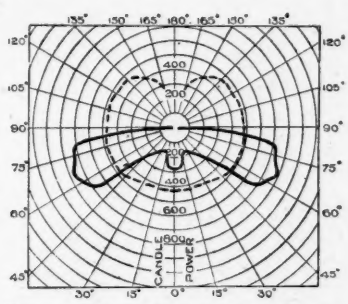


Fig. 3.—Polar Distribution Curve.

The B.T.H. Co. has also brought out a new type of weatherproof lantern for half-watt lamps, intended for use either indoors or out of doors; it consists of a heavy copper spinning, provided with an iron bush suitable for attaching to a tube or hook. The lower extremity of the spinning is reinforced and provided with suitable gallery screws to hold either a plain or a ribbed Alabas ball. The lantern is complete with a B.T.H. porcelain holder, and can be easily wired, after the removal of the globe, by detaching the lower portion of the holder. The lantern is well ventilated. This type of fitting is available either with or without an over-reflector.

Further particulars of these fittings, which are of British manufacture, can be obtained on application to the British Thomson-Houston Co., Ltd., Mazda House, 77, Upper Thames Street, E.C.

New Plug and Socket Connection.

From Mr. J. W. Annand, 329, Sauchiehall Street, Glasgow—who is the patentee—we have received a sample of a new type of plug and socket connection, which is claimed to get over the troubles caused by bad contact, sometimes found with the usual constructions employed.

In the new type (*a*) parallel contact is obtained; (*b*) the contact improves with usage; (*c*) it can be made in all sizes, large or small, giving equal efficiency; (*d*) the contact pressure can be varied according to requirements by making the outer part of heavy or light gauge tubing; (*e*) it is impossible to overstrain the leaves forming the spring.

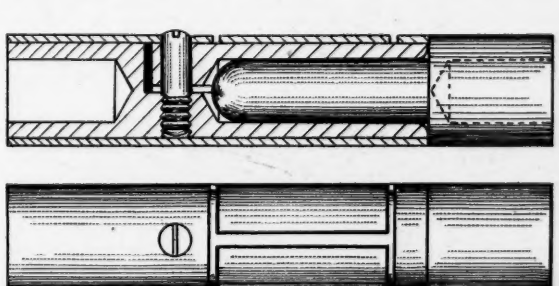


Fig. 4.—Section and Plan of Connection.

The accompanying sectional view, fig. 4, shows an example suitable for connecting two single cables, but it is clear that the method can be applied to all apparatus of the draw-out type, &c.

The socket part is machined and saw-cut; the outer, or spring portion, consists of a piece of solid drawn brass or copper tube cut

as shown, and fitted over the socket part; the small vertical pin serves to keep all sections in position; the plug part is machined, but no saw cut is required.

When the plug is inserted in the socket, it forces the sections of the socket apart against that part of the tube forming the spring, the plug in return being tightly held in the socket.

The patentee will be pleased to answer inquiries.

Oil-Electric Set.

The accompanying illustration shows an oil-electric set constructed by the Barlaw Engineering Co., Ltd., of 47, Victoria Street, S.W., which is of special interest in that the dynamo is a D.C. generator of 2,000 volts pressure. The latter was made by the India-Rubber, Gutta-Percha and Telegraph Works Co., of Silvertown, and is built on a standard frame with a double commutator, and provided with interpoles. The machine was subjected to very stringent tests, and gave a high efficiency. The

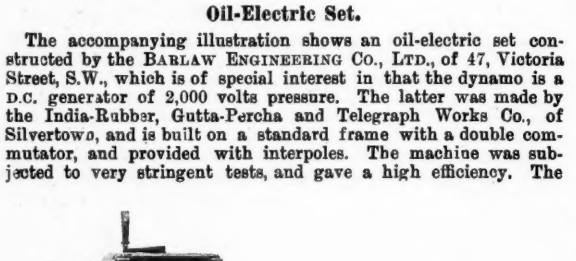


Fig. 5.—2,000-volt Oil-Electric Set.

engine is of the makers' standard type, governed to within 5 volts in 2,000 at full speed. The set was tested to 50 per cent. overload, and passed the ordeal with ease. The engine is of robust construction and can be run with little experience. The output of the set is 4 kw., and we understand that it is required in connection with a new industrial enterprise in which direct current at high voltage is necessary.

LEGAL.

Brush Electrical Engineering Co, Ltd.

A petition for the reduction of the capital of this company was heard by Mr. Justice Neville, in the Chancery Division, on Friday, October 23rd.

Mr. Sheldon, who appeared in support of the petition, to which there was no opposition, said that the company was incorporated in 1889, and there had been several reductions of capital from time to time and also rearrangements of capital.

His Lordship said he had been through the figures. Was there evidence of loss?

Counsel said yes, and the loss arose partly through depreciation of stock and partly through depreciation of patents which were valued in the goodwill. There had been a very large alteration in the profit and loss account since 1908, when a large reduction took place.

His Lordship asked what was the amount of the reduction now proposed.

Mr Sheldon said they were proposing to write off £235,732, and a loss of that amount was proved.

His Lordship sanctioned the reduction as proposed.

Read and Brooks *v.* The Stella Conduit Co.

The hearing of this action commenced before Mr. Justice Joyce, in the Chancery Division, on Friday, the 23rd inst., and continued on Monday, the 26th inst., it being an action brought by the plaintiffs, Mr. Albert Edward Read and Mrs. Ellen Brooks, for an injunction to restrain the defendants, who carry on business at the Highfield Works, Bilston, Staffordshire, from infringing plaintiffs' Letters Patents Nos. 18,375, of the year 1905, and 21,604, of the year 1906, the former granted to J. W. Brooks and the plaintiff A. E. Read for "improved means for connecting tubular electrical conduits together and to their fittings," and the latter, granted to the same persons, for "improvements in fittings for electrical conduits." Plaintiffs also claimed damages and the usual relief in a patent action.

The defence was a denial of the alleged infringement, and a plea that there was no subject matter in the plaintiffs' letters patent, and that the alleged invention was not useful and was a more particular application of common general knowledge which involved no invention.

Mr. A. J. Walter, K.C., Mr. Colefax, K.C., and Mr. Warmington appeared for the plaintiffs; and Mr. T. T. Terrell, K.C, and Mr. A. Grey for the defendants.

Mr. Walter said that the action was brought for the alleged infringement of letters patent, the subject matter of which was extremely simple, but related, however, to a matter as to which there was considerable demand.

Counsel said electric wires in houses were incased sometimes in wood, but were always protected in some way or other. The wires were bound to be isolated and protected to prevent people getting at them. There were two ways of doing this. One was to carry the wires in grooved pieces of wood, in wooden troughs, but with that method they had nothing whatever to do in the present case; the other method, and that was the one with which they had to deal, was where the wires were encased or carried in iron tubes, which, of course, afforded better protection. Rats could not, for instance, get through and sever the insulation, as they could do by eating the wood of the wooden troughs. The metal tubing was made of various sizes, according to the number of wires to be drawn through the tubes. Fire insurance companies and the various building authorities did not allow bare wires to be put in houses or buildings. In the present case they were dealing with devices having relation to the metal tubes containing the wires. The learned counsel explained that the plaintiffs' invention consisted of improved means for connecting tubular electric conduits together, and for connecting the tubular electric conduits to their fittings, such as elbows, tees, crosses, junction boxes, switches and the like, and which enabled the said parts to hold together without screws. He submitted that there was subject matter in which the patentees had done, and that the defendants had been guilty of infringement.

Mr. Jas. Swinburne gave evidence to the effect that there was invention in the device adopted by the patentees.

Mr. Terrell, on behalf of the defendants, argued that there was no subject-matter in the plaintiffs' Letters Patent, their alleged invention being merely another application of the old bicycle-head grip for coupling the ends of tubes together.

At the conclusion of the evidence and the addresses of counsel, his Lordship reserved judgment.

Unemployment Benefit.

At the Halifax West Riding Police Court last week, an electrician named Herbert Willie Pickles, of Elland, was summoned for making a false statement for the purpose of getting unemployment benefit under the Insurance Act. According to the evidence produced by Mr. H. H. Ramsden, of Huddersfield, who prosecuted, the defendant made an application for benefit under the Act on July 28th last. He signed the unemployment register in the usual way and received unemployment benefit. Afterwards, however, it was ascertained by Mr. Vernon Pearson, agent for the Unemployment Insurance Fund at Elland, that the defendant had worked three days for a Mr. Turner, electrician, of Elland. The defendant denied that he had signed the register on the days upon which he had been working, but the Bench said that they must deal with the case rather severely. The defendant would be fined 10s. and 22s. 6d. costs, with an alternative of 14 days' imprisonment.

The Electrical Engineering and Motor Co. (Carlisle), Ltd.

In the Chancery Division, on Tuesday, October 27th, Mr. Justice Eve had before him a motion in *re* The Electrical Engineering and Motor Co. (Carlisle), Ltd., Bolton *v.* The Company.

Mr. Johnstone Edwards, appearing for plaintiffs, said that he had a motion for a receiver and manager. There was a debenture-holder's action, there was an execution in and judgment had been signed upon debts of the company. On the previous day there was an application to enforce judgment for £75, and other writs had been issued. Counsel asked for a receiver and manager and the usual order. The only execution actually levied at present was as to the £75 under a bailiff's warrant.

Mr. Manning, for the company, said that he did not want to put obstacles in the way, as clearly the position of the company was difficult and serious. He was prepared to submit to the usual form of consent judgment.

Mr. Justice Eve said that of course he could give a judgment by consent.

His Lordship eventually appointed the Receiver and manager, with liberty to act at once, the usual order being made upon the agreement to treat the motion as the trial of the action.

WAR ITEMS.

Board of Trade Reports.

The following further information has been received at the Commercial Intelligence Branch of the Board of Trade :—

Japan.—H.M. Commercial Attaché reports, under date September 7th, that the exports of copper are practically at a standstill. Minor exports are being dealt in to some extent, and certain articles, such as cheap glassware, latex cups for the rubber industry, &c., are being shipped to the Straits Settlements to take the place of German goods. On the whole, the export trade, though considerably diminished, is being carried on with some vigour.

Russia.—H.M. Consul-General at Moscow has forwarded a report received from a reliable source in regard to the machinery import trade of Russia, which contains a list of various classes of machinery which have hitherto been imported from various Continental countries, but which it is considered might now be replaced by British manufactures. It is stated that about 15 years ago German machinery makers sent to Russia representatives who noted what had been supplied by British firms, copied some of the advantages, and proceeded to remedy defects which were pointed out by users, with the result that in a short time machinery was delivered from Germany which met users' requirements, and was delivered at Moscow at lower prices than English machines. All classes of machinery entering Russia have to pay duty by weight, and whilst English makers, with few exceptions, have practically ignored the *rôle* that weight plays when duty is imposed upon it, the Germans have attached importance to it. In many machines there are heavy rough cast-iron and other parts which could be made in Russia at a price which would considerably reduce the total cost of the machine to the purchaser, delivered at his mill or works. This is a phase in the machinery trade worthy of consideration by English producers of heavy rough machinery who are desirous of entering the Russian market.

With the development of municipal institutions in Russia it is asserted that there is a great field for contractors capable of installing waterworks, gasworks, electric light and tramway plant, &c., but recently German firms have invariably obtained such contracts. One of the causes contributing to their success in this direction has been the ready way in which the German business houses have met purchasers in regard to terms of payment, &c. This has been possible owing to the fact that the interests of various German makers have been so interwoven that they could obtain financial support where an isolated English supplier would fail. Moreover, whenever a big scheme has been under consideration, the German combines have had their representatives continually in touch with those who have had the placing of the orders, and by constantly assisting them free of charge to draw up specifications, these representatives have succeeded in getting specified just those classes, designs, models and sizes which could only be obtained from German firms.

British machinery manufacturers who wish to obtain a share of the Russian orders hitherto placed in Germany, are urged to commence the necessary propaganda at once, and not wait until the war has terminated. They should prepare their circulars in the Russian language, and cause them to be distributed to likely customers through reliable agents. The distribution of circulars in a haphazard way will do little good; they should be sent out by firms or individuals on the spot who know exactly who are the users of the machines described.

The report in question may be inspected by United Kingdom machinery manufacturers at the Commercial Intelligence Branch of the Board of Trade, 73, Basinghall Street, London, E.C.

The Commercial Intelligence Department of the Board of Trade has issued two further pamphlets in connection with its campaign series. No. 81 deals with rubber wares (other than machinery belting, tires for cycles, motor-cycles, and motor-cars and toys); and No. 82 is devoted to carbons for electric lighting.

The War and Turkish Trade.

We have received a communication from a correspondent in Constantinople bearing on the war and its probable effects on certain branches of British trade in Constantinople. He says that in considering the matter it is necessary, in the first place, to have a thorough and definite understanding as to what our firms at home are anxious to do. These firms he divides into two distinct groups:—(*a*) Those desirous of capturing the trade previously held by the Germans, by endeavouring to supply the public with what they have been so far purchasing from Germany, and (*b*) those that have been in the past, and still are, anxious to educate the public to appreciate the value of a superior article at a higher price. The latter class will, to a certain extent, profit likewise by this war, but our correspondent's remarks are addressed more directly to the first group, for sooner or later, when German commerce starts again, it will be the firms who can supply the same quality of material as their competitors, and at the same prices, that will derive a permanent benefit. He continues:—

"I ask these firms to bear in mind the following facts, and to thoroughly appreciate their importance.

"(*a*) Turkey is a country which for some years past has been in the hands of the Germans, and at the present moment especially, is very Germanophile. We may no doubt hope that after Germany has been brought to her knees, this feeling may be weakened, but for a year or two, it has to be taken into account; that means to say, that the general public will give preference to German goods if these are still sold at a lower price than the British product.

"(*b*) The success of a firm here will depend greatly, if not practically entirely, on the result of its efforts at the very outset of the resumption of business, for Britain is not the only country which is trying to profit on this market by Germany's eclipse.

"(*c*) After examining at work, and seeing the way German products give satisfaction to their purchasers here, it is most essential that our firms should once for all get the paralysing idea out of their minds that German exports are cheap and nasty. They are certainly cheap, but they are very often a credit to the ingenuity and labour of their originators. Engineers who live abroad, who are constantly in competition with Germans, gradually realise that they receive at home a wrong impression, and a fatal one, when they are brought up in their technical schools to despise German machines, &c. This may not apply to all branches of industry, but in the majority of cases it does. The consequence is that when an agent informs his principals that a certain article is being constantly sold cheaper by a rival, the unfailing answer is that it is of a cheaper quality. Granted that this is true usually, yet surely if the market wants a cheaper, but still reliable, article, it is for the firm to endeavour to produce it. How do our rivals get hold so thoroughly of business here? In the first place simply by asking their clients what they want, and not by telling them what they ought to have; and, secondly, by adopting offensive tactics, a policy which so characterises their military and commercial training. As soon as they see a British article appreciated, whether it be a lathe, an electric fitting, a tube, or a bottle of Worcester sauce, they get full particulars as to price and characteristics of the article, and then do not rest until they can produce a cheaper article which can, to a certain extent, equal the British product. What do our firms do in similar cases? They usually state that they would rather not compete in the inferior quality of product asked for. To this I have no answer to give, and it is not my business to criticise, but if a firm is anxious to get on here, then it must start working on a different basis, and carry the war into the enemy's camp. Competition in Turkey, and competition in the Colonies are different things, and have to be treated differently.

"*Iron and Steel Girders.*—These articles are practically all supplied by Germany and Belgium, and the difference in price between the Continental and British product is very appreciable. We have not as yet been able to get a satisfactory explanation for this.

"*Rails.*—These come in a large part from Belgium and Germany, the French lines usually favouring the former, whilst the German lines such as the Bagdad Railway purchase everything from Germany.

"*Tools, Iron and Steel Wire, Wire Netting, Metal Sheets.*—The large majority of these come from Germany, although England and the States import a fair amount of tools. As regards machine tools the Germans supply a lighter kind of tool as compared with the British product, and one which seems to do its work satisfactorily. I have come across several, in various works, and they have given their customers satisfaction.

"*Machinery, Steam Engines, Motors.*—Nearly all the factories here dating back a few years are equipped with British engines and boilers, &c., but to an equal degree, nearly all the engines, &c., coming in now, are of German manufacture. The latter do not possess the same finish, but are well made and give satisfaction.

"*Automobiles, Cycles and Motor-Cycles.*—The Austrian, German and French firms share this trade between them. The principal reason is that no British firms care to risk a little money by opening a garage here and keeping a car or two in stock on this market. Their competitors have done so, and in consequence, they get all the orders.

"*Electrical Cables, Lamps, Machinery.* — In this line the Germans excel, and deserve to get all the orders. They supply all sorts of electrical goods, keep large stocks always, give splendid deliveries, and are always anxious to satisfy new needs of customers. In the porcelain line of fittings they are supreme, and we have sent samples of porcelain switches, &c., to England repeatedly to be matched, and have been unsuccessful in our efforts. As regards electrical cable, we can buy here cable which is cheaper than bare copper wire in England. Naturally, we call it rubbish, but the customer finds that it lasts for a good few years, and therefore does not mind.

"Our competitors are also much more accommodating with their terms, and are usually disposed to give their customers a few months' credit. If only our firms would do the same, when we can assure them that the clients are safe, big progress would be made."

Finsbury Students and the War.—Any of our readers who know of any Old Finsbury Students who have joined the Forces, are asked to send their names, and as many particulars as possible, to Mr. F. R. C. Rouse, 15, Clifton Gardens, Golder's Green, N.W.

I.M.E.A. and Foreign Contracts.—A correspondent says the officials of the Electricity Committees of Corporations in Lancashire and other parts of the north of England have received a letter during the last week or two from the Incorporated Municipal Electrical Association asking for information with reference to the extent of the purchase of foreign manufactures by Electricity Committees, with a view to arrangements being made for the manufacture thereof by British manufacturers.

Delayed Contracts.—The delivery of machinery ordered for the electricity works extensions at Rochdale is being much delayed owing to the urgency of Admiralty orders received by the manufacturers. The manager of the electricity works has been instructed to do everything possible to expedite delivery.

Soldiers at Evening Classes.—Some thousands of soldiers are now billeted in Southport, and the Education Committee has decided to admit those who desire it to the evening classes, which cover a wide range, including electricity and magnetism, electrical engineering, and electric wiring.

Carbons for Electrical Purposes.

If we were to inform our readers that "British exports of carbons to Germany and Austria-Hungary are negligible," we believe that they would make remarks. And if we were to urge upon our traders that to ensure success in exporting carbons to Italy they must "conduct an energetic advertising campaign," and thus "capture a share of the trade hitherto done by their Continental rivals," they might well think that all of our staff were at the war, or ought to be. It is the sweet simplicity of the Commercial Intelligence Department of the Board of Trade that allows it to make these statements, for it can hardly be expected to know all that has been passing lately in the electrical Press and elsewhere regarding the supplies of carbons available in the United Kingdom. Its Pamphlet No. 82 is not prepared exclusively for electrical people, and but for the above-mentioned remarks, which may mislead the uninitiated, we should think it one of the most useful of its series of campaign publications. Although British firms are less likely to go capturing foreign trade in carbons than some other lines of manufacture until there are more of them available, we quote, for the information of those who, we believe, have been giving a good deal of thought to carbon manufacture of late, the following statistics, and refer them to the aforesaid C.I. Department for the complete document: —

Exported from Germany (1912):—

Carbon sticks for electrical arc lamps	£451,400
Electrode carbons, carbon threads for electrical illuminating appliances, carborundum articles other than grinding, polishing and whet stones; and other articles of plastic carbon or gas carbon (retort graphite)	90,200
Total	£541,600

Exported from Austria-Hungary (1913):—

Carbons for lighting purposes, less than 1 kg. per metre, &c.	£48,175

Exported from United Kingdom (1913):—

Electrical carbons	£10,064

The principal Colonial and neutral markets to which these goods were sent were as stated below.

The figures for Germany include the value of carbons exported to the United Kingdom (£90,650), and to Austria-Hungary (£45,400), and those for Austria-Hungary include exports to Germany (£21,500), and to the United Kingdom (£9,200). British exports of carbons to Germany and Austria-Hungary are negligible. Deducting these amounts, it appears that the exports of the three countries to all other markets were as follows:—

From Germany	£405,550
„ Austria-Hungary	17,475
„ United Kingdom...	10,000

The following statement shows the amounts sent from Germany, Austria-Hungary, and the United Kingdom respectively, to each of the principal markets hitherto supplied with electrical carbons by the two first-named countries:—

Country to which exported.	Exported from Germany (1912).		Exported from Austria-Hungary (1913).	Exported from United Kingdom (1913).
	Carbon sticks for electrical arc lamps.	Electrode carbons, carbon threads for electrical illuminating appliances, carborundum articles, &c.	Carbons for lighting purposes, less than 1 kg. per metre, &c.	Electrical carbons.
Canada	£3,500	£250	—	£259
Australia ...	10,750	—	£120	427
Norway	2,450	23,600	280	—
Sweden	5,450	9,000	200	—
Denmark ...	3,750	250	190	—
Netherlands ...	14,600	1,500	95	—
Belgium ...	33,850	2,400	1,405	68
France	44,250	4,750	1,300	237
Switzerland ...	9,300	4,100	140	558
Portugal ...	2,750	250	—	9
Spain	5,600	1,050	—	288
Italy	32,550	5,850	8,790	—
Roumania ...	5,200	50	3,560	—
Russia	18,850	5,400	110	201
Dutch East Indies	7,550	—	—	—
Japan	4,100	150	—	130
Brazil	5,350	500	—	95
Uruguay ...	4,250	200	—	82
Argentina ...	27,250	250	55	2,606
Chile	3,950	250	—	210
United States ...	69,450	12,750	30	17
Mexico	5,350	450	—	—

"It will be seen that practically the whole of this trade has hitherto been done by Germany, though Austria-Hungary has supplied small quantities to Italy, Roumania, Belgium and France. In view of the large quantities of coal annually carbonised in the United Kingdom at gasworks and coke ovens, there would seem to be a distinct possibility of diverting a large portion of this trade to the United Kingdom."

Australia and Manufacturing.—The war has led to renewed discussions in Australia concerning the question of manufacturing there many of the articles that have hitherto been imported. There is the same keenness there as here for securing German and Austrian trade. The South Australian Chamber of Manufacturers, at a meeting early in September, passed the following resolution:—

"That, with the object of encouraging Australian manufacturers to go to the expense of increasing their plants and premises for the purpose of manufacturing goods previously imported from Germany and Austria into Australia, all specifications for either Commonwealth or State Government contracts should absolutely prohibit the use of manufactured articles or materials produced in either Germany, Austria, or their dependencies for a term of at least 21 years, provided that this does not apply to materials at present in Australia or on the water prior to the declaration of war."

The chairman of the meeting, Mr. W. Forwood, in the course of his speech said:—"During the year 1912 Australia imported from Germany between £7,000,000 and £8,000,000 worth of goods, many of a kind that can be easily manufactured in the Commonwealth if our Governments and people will only give our manufacturers a fair chance to do so. Portion of this money has been used to provide means for slaughter and the maiming of thousands of husbands, fathers, sons, and brothers of our own kin for one of the most unjustifiable wars of modern times, a war that has for its ultimate objective the destruction of the British Empire and the annexation of Australia by people who, by their behaviour in this war, have shown their brutal character."

Mr. H. E. Pratten, president of the New South Wales Chamber of Manufactures, in a recent address, is reported to have advocated the following practical methods of capturing German trade:—

"1. A system of preferential and reciprocal trade throughout the Empire in favour of British-made goods, or a surcharge on goods made in Germany before they are allowed to enter.

"2. An education in national sentiment and patriotism that would make it difficult to sell any goods made in Germany if any reasonable alternative source of supply existed.

"3. A development of new industries throughout the Empire, aided, if necessary, by the importation of highly-trained technical German workers, that would be able to supply and displace goods previously largely obtained from Germany; and by the application of science and industry to the fullest extent, emulating and imitating the marvellous success achieved in Germany in this direction."

In a letter to the *Melbourne Age* the Cooper Engineering Co. Pty. says, on the question of extending Australian Manufacturing, that it has recently undertaken the manufacture of electrical necessities that are not made south of the line. "We refer specially to zincs required in the upkeep of Leclanché cells, and the casting and formation of accumulator plates. This is the first time that these things have been manufactured in Australasia, and we have put down a plant sufficient to cope with the demands of the whole Commonwealth. These are absolute German lines, although they are manufactured in small quantities in England and Belgium. It might be added that we are competing in the manufacture of same without any tariff assistance, and since the outbreak of war we have received orders and inquiries from Brisbane in the east and Perth in the west."

Liverpool and German Contracts.—Representations to the Board of Trade.—Liverpool is to make representations to the Board of Trade, in order to point out the danger of allowing current contracts with German companies, whether registered in England or not, to remain in operation and payments to be made thereon during the time of war. The decision was recorded by the Tramways Committee, on the 21st inst., after a full discussion in camera of the situation created by the recent resolution of the City Council on the subject of the unexpired contracts from the patent welding or repair of tramway rails. Both contracts were made with companies registered in England, but consisting almost entirely of German shareholders resident in Germany. In each case the contract for welding or repair had reference to contract which was to be executed "when required." Roughly speaking, three-fourths of one contract and one-fourth of the other had been executed when hostilities were commenced.

The City Council by a majority of six votes—49 to 43—resolved at the October meeting to continue the contracts without regard to the war, but a strong protest against this course followed, and the Tramways Committee felt compelled to review the situation. A long debate ensued, and eventually the Committee decided to make representations to the Government through the Board of Trade as to the national danger of trading, however indirectly, with Germany so long as the resources of that country were being conserved to wage war against Great Britain and her allies.

Manchester Students with the Forces.—The Manchester School of Technology possesses particulars of more than 550 students who were in attendance at the college during the academic year 1913-14, and who are now serving in various branches of His Majesty's Forces. With a view to the completion of a Roll of Honour, which shall also include the names of past students engaged upon military service, the Registrar will be glad to receive any information from such persons themselves or from their relatives or friends.

British Asphalt.—The Limmer Asphalte Paving Co., Ltd., send us a communication in which they show that they are entirely British, in capital, directorate and management, have their mines in France and none in Germany or Austria, and that the bitumen for their joint-box, troughing and other special uses comes principally from the British Colonies. They employ Germans or Austrians nowhere.

Northampton Tramways Manager.—At the eleventh hour and chiefly with a view to avoiding municipal contests, which would have thrown the town into a turmoil, the Northampton Town Council at another special meeting on Monday decided to give Mr. J. Gottschalk, the tramway manager, £300 in lieu of notice. Mr. Gottschalk, it will be remembered, is of German birth, and he has managed the tramways during the nine years they have been owned by the municipality. Agitation for Mr. Gottschalk's removal commenced upon the outbreak of the war, but since then he has obtained his naturalisation papers. A special meeting of the Council confirmed the opinion of the Tramway Committee, expressed upon three occasions, that Mr. Gottschalk should continue to hold office, and then the anti-Gottschalk faction in the town, who had a large following, threatened to contest the elections, and they secured their candidates, who handed in their papers on Saturday. Feeling in the town ran so high last week that it was considered advisable by all parties that a compromise should be arrived at. Representatives of the pro and anti-Gottschalkites held a meeting, at which the suggestion was made by the former that Mr. Gottschalk should be suspended and paid one-third salary—£133 6s. 8d. per annum. This was after Mr. Gottschalk had asked the Tramway Committee to relieve him of his post for the period of the war. These terms were not accepted by the anti-Gottschalkites, in spite of the fact that the Mayor-Elect (Mr. F. C. Parker) had intimated that he would reconsider his decision to accept the Mayoralty if there were elections. Monday was the day for the withdrawals at 2 p.m., and the Council met at noon. There was a rather tumultuous meeting, the attack on Mr. Gottschalk being described as "un-English, un-Christian and dastardly." Half an hour before the time for withdrawal there was a deadlock, and the Council agreed to "accept Mr. Gottschalk's resignation," and compensate him to the extent of £300. The anti-Gottschalk candidates withdrew, with the exception of one, a few minutes before two. In this ward there is some personal feeling, and the candidate is not now an official "anti-Gottschalk."

At the Council meeting it was hinted that if the elections were fought it would not be safe for candidates supporting Mr. Gottschalk to go about, and there might be a riot. We understand that Mr. Gottschalk, with whom much sympathy has been expressed, has stated that he is satisfied with the decision of the Council.

U.S. Electrical Imports and Exports for August.—The *Electrical World* gives the following monthly summary of the foreign commerce of the United States issued by the Bureau of Foreign and Domestic Commerce. The imports in electric lamps were valued at $53,403 in August, 1914, and $34,296, in August, 1913. This unusual increase may represent the output of foreign manufacturers who hastened shipment in the early days of the war. The principal gain was in metallic-filament lamps, which increased 87 per cent., or from $28,311 to $52,948. There were no arc lamp imports in August, and imports of carbon-filament lamps had a value of but $455. Exports, on the other hand, declined from $2,279,015 in August, 1913, to $1,024,010 in August, 1914. The value of batteries decreased from $45,326 to $38,722, generators from $134,136 to $114,570, fans from $46,408 to $5,528, insulated wires and cables from $219,736 to $51,236, interior wiring supplies and fixtures from $66,385 to $43,511, arc lamps from $10,387 to $1,620, incandescent lamps from $69,522 to $11,930, motors from $119,280 to $118,490, static transformers from $156,727 to $33,609, telegraph instruments from $6,425 to $3,101, telephones from $189,160 to $78,403, and "all others" from $952,705 to $197,543. The only increase was in meters and measuring apparatus, the value of which was $23,747 in August, 1914, as compared with nothing in the previous year.

Personal.—The following is a list of employés in the electricity department of the Grimsby Corporation who have enlisted in H.M. Forces:—G. Sampson, A. Gibbons, H. Wilmore, H. Welham, F. Wells, T. Thompson (boiler cleaner), H. Hudson (engine cleaner), F. Wilmore (fitter's mate), E. Thompson (joiner's mate), S. Cordock and S. Bradley (labourers), G. W. Parker (mains superintendent), A. Nuttall (motor tester), G. Cooper (motor repairer), G. Wilkinson (joiner), and C. Wells (clinker wheeler).

Mr. J. Callaghan, electrician, in business in Gatsford Road, Worksop, who, on the outbreak of war, rejoined the King's Own Yorkshire Light Infantry as a Reservist, is a prisoner of war in Germany. He was captured whilst wounded on August 26th, and, in a letter to his wife, states that he is almost well, and is being treated very well.

Lance-Corporal J. Jordan, of Bury, who, prior to the war, was in the service of the Lancashire E.P. Co., is reported missing.

Private Hammond and Private Bradley, who were formerly employed as motor inspector and motorman respectively, and have returned home from the front wounded, were *fêted* at the Blackburn Corporation Tramway Men's Institute on Tuesday evening, October 13th. Mr. C. Higham (ex vice-chairman of the Tramways and Electricity Committees) presided, and was supported by Mr. J. H. Cowell (general manager of the tramways), Mr. Redmayne and others. There was a good attendance. Mr. Cowell emphasised that the tramway workers were acting nobly during this great crisis. Fifty-six of the Blackburn staff had already joined the Colours, and those left behind were contributing over £9 weekly towards the Prince of Wales's Fund. Private Bradley returned to his military duties the following day, but Private Hammond's furlough has not yet expired.

Roll of Honour.—Lance-Corporal W. Burns, of Salford, who was a Salford Corporation tramway guard, has been killed in battle.

Private Frank Bradshaw, of Higher Broughton, Salford, a motorman in the employ of the Corporation tramways department, has died from wounds received in the battle of the Aisne.

All British.—The Dussek-Bitumen Co., of Canal Bank, Deptford, and Messrs. Dussek Bros. & Co., Ltd., send us information respecting these businesses, showing that both concerns were founded and controlled by British subjects, and have British capital and British employés. Col. H. A. Christmas, a director of Dussek Bros. & Co., Ltd., is now serving his country; Mr. E. A. Dussek is doing likewise with Lord Kitchener's Army, and Messrs. A. S. Dussek (ex-naval volunteer), A. E. H. Dussek and L. A. Dussek are training in volunteer forces.

Oldham Tramway Contracts.—During the consideration of accounts by the Oldham Tramways Committee on October 22nd, a member inquired whether a certain firm was German; if it was, he suggested that they should have no further dealings with it. The manager replied that 60 per cent. of the capital of the firm was British. He had given full details to the chairman of the Committee, and would let the various members have the particulars.

Lancashire Tramwaymen and Red Cross Work.—A movement has been started with the object of forming a detachment of the British Red Cross Society for the employés of the South Lancs. Tramways Co. So far some 30 names have been given in at Atherton of those desiring to join, and when a sufficient number has been enrolled arrangements will be made for lectures to be given to the men.

Drilling Machines.—Messrs. Morris & Lister (London), Ltd., of Westminster, S.W., announce that they are making a general reduction in the price of all their drilling and grinding machines with a view to securing as much as possible of the trade which formerly went to Germany.

BUSINESS NOTES.

Australian Customs Tariff Inquiry.—*The Import Duty on Generators.*—According to the *Sydney Daily Telegraph*, Mr. Forbes Mackay appeared before the Inter-State Tariff Commission to support the petition made by the Melbourne Electric Supply Co. for the reduction of the duty on electric generators for direct-coupling to steam turbines. The present tariff made a distinction between the turbines and generators. Mr. Mackay thought that the latter should be on the same footing as the turbines, which were free if British made. By charging duty on generators, the Commonwealth Government tended to increase the cost of electricity. This view was supported by Mr. Donoghue, the chief engineer of the Electric Light and Power Supply Corporation, who said the generators could not be made in Australia, and it would not pay anyone to start such an undertaking. The application was also supported by Mr. Erskine, of Crompton & Co., Ltd., and Mr. Mulroney, of Shaw Wireless, Ltd.

The Government's Interest in Construction Material.—According to the same jounal, Mr. William Hutchinson, chief engineer for railway and tramway construction of New South Wales, appeared, by direction of the Minister of Works, to oppose extra duties on rails and materials used in railway construction. He said their last contract represented £6 13s. 6d. per ton f.o.b. England for 80-lb. rails. The freight was £1 3s., making £7 16s. 6d. *ex* ship Sydney. The duty was based upon £6 13s. 6d. plus 10 per cent. There were lightering charges in addition, so that the total cost of the rails equalled £8 13s. 6d. That meant £2 per ton in favour of the local manufacturer. Mr. Huchinson considered his department had a grievance, too, in connection with American rail importations. He paid £6 16s. c.i.f. for a 60-lb. rail, but the duty had been charged on the freight as well, as the Controller of Customs had fixed a definite price for American steel rails.

Book Notices.—*British Industry and the War.* By J. Taylor Peddie. 1s. net.—In this pamphlet the author, who is the chairman of the Provisional Organising Committee of the proposed Institute of Industry and Commerce, sets forth the objects of the scheme. The need for the better organisation of British industry, the reorganisation of the educational system in force at our Universities, Technical Colleges and Secondary Schools, the reform of the British Consular service on business-like principles—these are among the many points covered in the course of the author's comments, and in the reported speeches of well-known men who were present at the inaugural meeting of the movement held on October 8th. Mr. Peddie advocates the opening of a subscription list, which shall remain open for several years if necessary, until it reaches £1,500,000, the interest received on this capital sum to be devoted to the development of national and inter-Imperial trade and other matters of general trade interest. The speeches of Sir C. W. Macara, Bart., Earl Grey, and other speakers will form profitable reading for all who are seriously studying the industrial possibilities of the present position. We observe that several trade organisations were represented at the function, the B.E.A.M.A. among them, and one of the resolutions passed invited each of these organisations to nominate a delegate to act on the Organising Committee which is to take the steps necessary to form the Institute of Industry and Commerce. It is proposed that the Institute shall have its home in Aldwych in the building proposed by Earl Grey in his Dominion House project. We observe at the end of the pamphlet a statement of the constitution and some of the principal objects of the scheme. Although the Organising Committee has only just been appointed, it is stated that very many things are already done. An Imperial Advisory

Committee has its duties allotted to it, an Irish Advisory Council is also to be formed, and it is further stated that a strong Provisional Committee of journalists and publishers has been appointed—why?—because the "usual trade journals are deadly in character" (whatever that may mean—it reads very much like the reports of the firing of the British monitors on the German trenches!) It is intended, for the purpose of stimulating trade within the Empire and its neutral markets, to establish an official trade journal, which shall be "lively, illustrated and interesting at all times," and shall provide "a remunerative source of revenue for the Institute." We frankly confess that we think it somewhat spoils all ambitious and deserving schemes for the better organisation of British industry when they end like this—a huge subscription list of 1½ millions sterling, and the revenue from a lively trade journal, seem to be the most pressing needs of the moment.

The *Tramways and Light Railways Journal* for October (6d.) contains the Board of Trade Regulations relating to guard wires on electric tramways and light railways laid on public roads, also a report on defects in tramcar controllers.

"Institution of Electrical Engineers. List of Officers and Members." 1914. London: The Institution.

Catalogues and Lists.—British Thomson-Houston Co., Ltd., Rugby.—List No. 4,160 (16 pages), fully describing, illustrating, and giving outline and connection diagrams of their ironclad draw-out oil-break switchgear.

Messrs. Holophane, Ltd., 12, Carteret Street, Queen Anne's Gate, London, S.W.—Illustrated list of Holophane glassware for half-watt lamps—reflectors and semi-indirect bowl, reflector hemisphere and "Excellite" types. Prices of each type are given in tabular form.

Messrs. Siemens Bros. & Co., Ltd., Woolwich, London, S.E.—Forty-page illustrated pamphlet (No. B. 517), giving full descriptive information concerning the "O. S." wiring system. The larger part of the publication is occupied with a collection of excellently executed half-tone pictures of buildings of all kinds at home and abroad which are wired with "Stannos" wire.

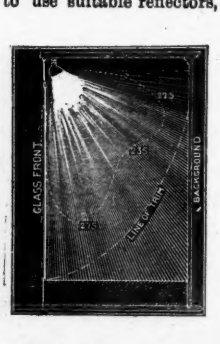
The Cressall Manufacturing Co., 40 and 41, Staniforth Street, Birmingham.—Illustrated and priced leaflet relating to woven wire resistance netting, and "Cord" resistance material.

Messrs. L. Andrew & Co., 2, Whitworth Street West, Deansgate, Manchester.—Net wholesale price list of insulating materials for electrical purposes.

Edison & Swan United Electric Light Co., Ltd., Ponder's End.—Ten-page illustrated price list of Royal Ediswan drawn-wire tungsten-filament lamps of a wide range of candle-powers and voltages, and in various shapes of bulb, including, in addition to the every-day types, fancy, crinkled, tubular, olive-shaped and "Downlite" lamps. The front cover is of true British colouring and design.

In issuing a neat little brochure on Ediswan radiators, the company draw attention to the important selling point that the electric radiator, unlike all others, can be placed in any part of a room, and need not be put in the fireplace.

Shop-Window Lighting.—Referring to the gloomy appearance of the streets of eastern towns after dusk, due to the precautions adopted against a possible attack by enemy airships, the British Thomson-Houston Co. have written to point out that shopkeepers do not adopt the right methods of reducing their window illumination. Switching out lamps is certainly effective in one sense, but renders the window useless for displaying goods except in the daytime. Shading the lamps with coloured paper, &c., is less drastic, but crude and possibly dangerous. The proper course is obviously to use suitable reflectors, such as the B.T.H.



"X-ray" type, specially designed to throw the light inwards on the wares instead of wasting it on the foot-path. Not only should this method prove effective against the guidance of Zeppelins and profitable to contractors, but also it may help to counteract the barbarous tendencies of the average tradesman towards the use of a violent glare outside his shop window, and thus may assist in bringing about a permanent reform in this respect. To walk at night along some London streets that we could name, before the war began, was positively and literally painful. The accompanying illustration shows how the company above-named would deal with the case.

Time Switch Approved.—The B. of T. has given its approval to the Venner time switch type "C" deposited in October, 1913, by Venner Time Switches, Ltd.

Books Received.—"The Underwar: Patriotic Policy in British Trade." By A. G. Whyte and T. C. Elder. London: Electrical Press, Ltd. 1s. net.

Winter Resort.—For the benefit of those who, for obvious reasons, will not this year desire to follow their accustomed habit of wintering abroad, the Falmouth municipality has issued an illustrated handbook in which the attractions and claims of that resort are set forth. Copies may be obtained free from the Town Clerk.

Lantern Slides for Lectures.—Messrs. Edward Bennis & Co., Ltd., (Publicity Department, 28, Victoria Street, S.W.), inform us that they have a number of lantern slides dealing with the development of mechanical stoking, elevating and conveying apparatus, which they will be pleased to loan to any responsible engineer for lecture purposes. A list of the slides and particulars of their subject matter can be obtained on request.

Trade Announcement.—With reference to a notice appearing under "New Companies" in our last issue respecting the registration of a new company with the name of Wm. Sanders and Co., Ltd., we are asked by Messrs. Wm. Sanders & Co., switchgear manufacturers, of Falcon Electrical Works, Wednesbury, and 90, Charing Cross Road, London, W.C., to state that they are in no way connected with the new concern.

New Industry.—At Heath Town (Wolverhampton) District Council last week, plans were approved for the building of new works by the A.B.C. Coupler Co., Ltd., of London, at Park Village, on the estate of Sir R. A. Paget, Bart. The works are for the manufacture of electrical and engineering appliances for use in the construction of railways.

Trade Expansion. — It is stated that a Committee known as the Committee for the Expansion of British Trade has been formed, with offices at 19, St. James's Street, Sheffield. It proposes to consider and deal with many of the handicaps under which British manufacturers labour in the markets abroad.

Stoker Contracts.—Among recent sales of stokers, &c., effected by the Underfeed Stoker Co. are the following for electricity works:—

Central Electric Supply Co., St. John's Wood	4 E.
South Metropolitan Elec. Light and Power Co.	2 A.
Bristol Corporation Electricity Department	2 E.

Patent Restoration.—An order has been made restoring the following patent:—C. E. Hunter. "Improvements in electric switches." No. 27,196 of 1903.

LIGHTING and POWER NOTES.

Aldershot.—The U.D.C. has given notice that no further applications for current for photographic arcs or equivalent purposes will be entertained at present.

An appeal on the amount of the reassessment of the electricity works, which is £1,120 as against £215, is to be made, unless the estimate of the engineer, £510, is accepted.

Argentina. — A new electricity company is being formed in Santa Fé to exploit the various agricultural colonies of the Province. The capital will be a million dollars.

The tariff of the River Plate Electricity Co. in La Plata has been in force 10 years, and current is said to be dearer than elsewhere in the Province. The Government and public authorities are now urging a reduction in price.

The Government is generally in favour of the Mollard Concession for making use of the falls of the Rio Uruguay for hydro-electric works.

The Electricity Co. has suppressed the public lighting at San Luis, and insists on being paid $100 a day before it will resume service.

The Coronda (Santa Fé) authorities are considering the installation of a public electric service.—*Review of the River Plate.*

Australia.—The North Sydney (N.S.W.) Council has come to an agreement with the Sydney City Council for the supply of electricity to private consumers at the same rate as elsewhere. The City Council must complete the installation within 12 months, under penalty.

Barrow.—Plant Extensions.—The T.C., on Monday last, on the recommendation of the Electricity Committee, agreed to increase the supply of energy to Messrs. Vickers's Works, from 1,040,000 to 5,000,000 units per annum for a period of three years, and with a guarantee of 3,000,000 units for a further two years. It was decided to apply to the L.G.B. for sanction to borrow £13,000 for plant extension, and to accept the tender of the B.T.H. Co. for one 2,000-kw. turbo-alternator, with condensing plant, &c., for £6,718. The purchase of boiler and other plant was left to the chairman and engineer.

Barking.—The Education Committee has decided to obtain estimates for installing electric light throughout the North Street School. The District Council has been asked to take steps to remove all sources of possible electrolytic trouble in connection with the lighting cables.

Blackpool.—Works Extensions.—With a view to carrying out extensions at the electricity works, it is proposed to acquire a block of property in Caroline Street.

Bradford. — Proposed Loan, &c. — The Electricity Committee has accepted the terms agreed between the electrical engineer, representatives of the B.E.A.M.A. and Messrs. Freer and Howard, in regard to the payment of expenses already incurred in connection with the proposed Bradford Electrical Exhibition. Application is to be made to the L.G.B. for sanction to a loan of £52,000 for new mains, transformer chambers, &c., services and foundations. The Committee has decided to support the I.M.E.A. in the promoting of a joint private Bill for the purpose of obtaining increased powers with regard to electric supply.

The Committee has also resolved to contribute £50 towards the cost of the defence in the action of Attorney-General (at the relation of the Ilford Gas Co) *v.* Ilford U.D.C., in which the question of undue preference to certain consumers of electricity is raised.

Buxton.—Proposed Loan.—The U.D.C. has applied for a loan of £2,335 for electricity purposes, and to cover £335 overspent on a prior loan.

Chelmsford.—Police Court Lighting.—The T.C. has decided to install electric light in the police courts and other portions of the police buildings not at present lighted by electricity.

Dartford.—The U.D.C. has applied to the Dartford R.D.C. and the West Kent Electric Co. for their consent to the supply of current to the Wilington Works of Messrs. Vickers.

Darwen.—Power Supply.—The Corporation has agreed to supply electricity required for power purposes at the Springfield Mill.

Deal.—Prov. Order.—The T.C. has decided, on the advice of Mr. Lacey, to apply for a prov. order for electric supply, the estimated cost of the plant, apparatus, and mains is £12,000, and with other outlay the total is placed at about £16,000. It was understood that the application was to be made if the Walmer U.D.C. joined in as recommended by a Joint Committee.

East Ham.—The electrical engineer has been directed to furnish an estimate of the cost of wiring Brampton Road School. The Electric Lighting Committee has under consideration applications from hirers of arc lamps for a rebate to be made in the charges, in view of the largely reduced consumption of current caused by the police restrictions.

Eccles.—British Goods.—The T.C. has consented to supply particulars of purchases for the electricity department from foreign manufacturers to the I.M.E.A., with a view to arrangements for the goods so purchased being made by British firms.

Edinburgh.—Mains Extensions.—The Electric Lighting Committee has decided to extend the mains to Colinton, a considerable number of residents in the district having agreed to take electric light.

The Committee has remitted the question of the purchase of an electric car and electric lorry to a sub-committee for consideration and report.

Egham.—Mr. A. P. Trotter, of the B. of T., who heard objections to the erection of an electricity generating station at Egham, in 1911, has written to the Council and been informed that no complaints had been received as to noise, vibration, or anything else.

Enniscorthy.—Prov. Order.—The U.C. has decided to make application to the B. of T. for a prov. order to supply electricity in the town and district.

Exeter.—The Electric Lighting Committee, in reply to a communication from the I.M.E.A., has agreed to subscribe towards the expenses of the Ilford U.D.C. in its case with the Gas Co, and the city electrical engineer has been authorised to attend and give evidence if required.

Falkirk.—Plant Extension.—The T.C. has accepted the contract of £3,620 for the installation of a new battery at the electricity works and of £907 for a new switchboard. The battery is required to equalise the load and as a stand-by; the new installation is expected to result in a saving of £80 per annum.

Fleetwood.—New Plant Started.—The new 550-kw. turbo-dynamo which, with condensing plant, has been installed at the electricity works, was formally started by Mr. R. Eaves, chairman of the D.C., on October 23rd. The extensions which have been carried out at the works have cost about £7,000.

A sub-committee is conferring with the electrical engineer on the question of improved lighting in Lord Street and North Albert Street.

Gillygaer.—E.L. Scheme.—The U.D.C. has received from the South Wales Electrical P.D. Co. terms for lighting the Fochriw district, and these have been submitted to the consulting engineer (Mr. Dixon) for a report.

Haworth.—Prov. Order.—The U.D.C. has decided to apply to the B. of T. for a provisional order to supply electrical energy within the urban district of Haworth.

Huddersfield.—In connection with the extension of the Corporation gas works, inquiries are to be made from the Electricity Committee as to the cost of electric power for the new plant which is to be installed.

Irlam.—Prov. Order.—A favourable report having been presented to the U.D.C. in regard to the prospects of demand for electricity for lighting and power purposes, it was decided last week to make application for a prov. order before December 21st.

Knowle.—Village Lighting.—An E.L. scheme for this village has been carried out by Mr. J. Dennis, at whose sawmills the plant is installed. Six public lamps have been connected, and it is anticipated that private houses and the public buildings will take a supply of current.

Liverpool.—At the annual meeting of the Lighting Committee, in reviewing the work of the past 12 months, it was stated that there were now 10,800 consumers, as against 9,600 last year. Applications for energy for power purposes of about 4,500 H.P. had been received, and the revenue for the six months ending June last had increased by £8,000 over the corresponding period last year. £25,000 had been allotted for the relief of rates during the current year.

London. — St. Pancras. — Ljungstrom Turbine Results.—In a report to the Electricity Committee, Mr. Sydney Baynes points out that the 1,000-kw. Brush-Ljungstrom turbine has been in use since July, and has generated nearly two-thirds of the output of King's Road station. The steam consumption has been less than the guaranteed figures, being as follows:—On full-load, 12·75 lb.; ¾-load, 13·57 lb.; ½-load, 14·67 lb.; and ¼-load, 17·76 lb. per kw.-hour. This has resulted in a coal saving equivalent to £1,700 per annum. The plant runs noiselessly, and the electrical and mechanical control is all that can be desired. The improved steam consumption, particularly on low loads, as compared with the earlier turbine plants, is very marked. The department has a 5,000-kw. turbine of the same make on order, the steam consumptions guaranteed being:—Full-load, 11·8 lb.; ¾-load, 12·38 lb.; ½-load, 13·4 lb., and ¼-load, 15·9 lb.; and it is anticipated that these results may be improved on in use.

L.C.C.—The Finance Committee recommends the Council's sanction to a loan of £10,504 by the Poplar B.C. for the electricity undertaking.

Lambeth.—The B.C. has been recommended to renew its agreement with the South London Electric Supply Corporation, Ltd., for the lighting of Electric Avenue, Brixton, for a further period of five years.

Poplar.—As the Port Authority is to extend pumping operations to the East India Docks, the engineer recommends that an additional E.H.T. feeder should be laid from the generating station to the Blackwall sub-station, and an L.T. feeder from the sub-station to the Docks, at a total cost of £1,996. The Committee has recommended the carrying out of the work.

Manchester.—The Corporation is supplying electricity free to local drill-sheds where recruiting and rifle practice is being carried out.

Manorhamilton (Co. Leitrim).—Workhouse Lighting.—The B. of G. has decided to apply to the L.G.B. for sanction to have the Workhouse lighted by electricity. The installation is to be carried out by the Manorhamilton and District E.L. Co.

Normanton.—Prov. Order.—The U.D.C. has decided to promote an electric lighting order in the next session of Parliament.

Oldham.—Power Supply.—The Electricity Committee has received an application for the supply of energy from Messrs. Bradbury, engineers, who have decided to electrify their Wellington Works.

Salford.—Proposed Loan.—The T.C. has been recommended to apply for sanction to borrow £9,410 for additional plant at the electricity station. The Electricity Committee has accepted the offers of Messrs. Chamberlain & Hookham, Ltd., and the British Thomson-Houston Co. to accept the return of 200 old electricity meters supplied by them and to supply new ones in exchange.

Southampton.—The conference between the Electricity and Tramways Committees, with a view to a reduction in the price of current supplied to the tramways department in accordance with the finding of the experts' report, has been postponed until the Electricity Committee has had an opportunity of fully considering the report.

Stainborough.—Overhead Lines.—The Yorkshire E.P. Co. has applied to the B. of T. for consent to use 2,000-volt overhead lines from Wentworth Silkstone Colliery to Lowe Wood, Stainborough, in the area of the Barnsley R.D.C.

Walmer.—Prov. Order.—The U.D.C. has decided not to apply for a prov. order for E.L.; it had been recommended that the Council should co-operate in the matter with the Deal T.C.

Warrington.—The Electricity Committee of the T.C. has received a letter from the Mersey Power Co., Ltd., asking for clauses to be inserted in the proposed provisional order for providing a future date for a repurchase of the area by the company, at the then value, and adopting a 50-cycle 440/250-volt system. The Committee has agreed to the latter clause, but refuses the condition as to repurchase.

Walthamstow. — Proposed Loans. — The Public Lighting Committee recommends that application be made for sanction to borrow £14,590, made up as follows:—600-kw. set, £3,610; 1,500-kw. turbo-alternator, £7,350; 1,000-kw. rotary converter, £3,035; low-tension cable together with controlling switchgear, £595, and that tenders be invited for the above-mentioned plant. The Finance Committee recommends the formation of a Sub-Committee to consider the question of the capitalisation of the electricity undertaking, with a special view to making arrangements for dealing with the cost of superseded work. It has been agreed to reduce the assessment of the electricity undertaking from £6,500 to £6,000 rateable value, and to further reduce from £2,000 to £1,350 the assessment of the light railways undertaking.

Willesden.—The electrical engineer recommends the laying of an additional feeder, at a cost of £4,000, to meet the growing demand at Willesden Green. The Committee proposes to supply energy for cooking purposes experimentally to certain schools at 1d. per unit, and to Christ Church, Brondesbury, for experimental heating.

Windsor.—Electric Pumping Saving.—In the annual account of the Windsor Corporation are included the sewerage works results, which show a great saving due to the adoption of electric pumping. A comparison of similar items as between 1912 and 1914 shows, in the former year, the following costs:—Wages, £759; coal, £398; engine charges, £44; electric pumping, £11; a total of £1,202. In 1914 the figures were:—Wages, £429; coal, £31; engine charges, £8; electric pumping, £298; a total of £766, showing a saving of £436, which has been utilised in half-payment for the electric pumping plant.

TRAMWAY and RAILWAY NOTES.

Aberdare.—Proposed Tramway Extensions.—The U.D.C. has decided to seek Parliamentary powers for the extension of the tramways on the Abercwmbri route to a point near the Aberdare boundary; an extension along Regent Street along the present railless route to the terminus at Cwmaman; an extension from the Cemetery to a terminus at Hirwain; the extension of the existing Cwmdare railless route; and a new railless traction route to Llwydcoed, and from the Abernant route to Cwmbach.

Argentina.—The Government has approved of the Anglo-Argentine Tramways Co. taking over the administration of the combination passenger services on its lines and those of the Buenos Ayres-Quilmes Co. The electrification of the Quilmes horse tramway is expected to be complete by November 1st. The Compania de Tramways Electricos del Sud has been authorised to open its branch line to Plaza Constitucion.—*Review of the River Plate.*

Bolton.—The Tramways Committee has decided to relay the track in Great Moor Street—in the centre of the town.

Brighouse.—New Tramways.—The Corporation has decided not to support the Halifax Parliamentary Bill, so far as it relates to the construction of tramways from the centre of Brighouse to Rastrick, and has accepted the proposals of the Huddersfield Corporation, which intends applying for powers for an extension of the tramways from the present terminus at Brighouse to near the terminus of the Halifax tramways.

Bristol.—The Corporation recently adopted a report by the Tramways Committee, which contained a recommendation that the latter be authorised to negotiate with the company with a view to ascertaining what rent the company would pay if the Corporation refrained from exercising its option to purchase for 7, 14 or 21 years.

Colwyn Bay.—The U.D.C. has received intimation from the constructional engineer of the Llandudno and Colwyn Bay Electric Railway of the extension of the line from Colwyn Bay to the Queen's Hotel, Old Colwyn.

Croydon.—Loan Sanction.—The T.C. has received the B. of T. sanction to a loan of £1,918, for a double line of tramway between Selhurst Station and Princess Road.

Edinburgh.—The Tramway Committee of the T.C. recommends the Corporation to include in its application for a prov. order proposals for the extension of the tramway to Corstorphine village, and for the linking up of the Comiston Road and Craiglockart routes by way of Firhill to the south of the Colinton Hospital.

Halifax.—Proposed New Tramway.—A sub-Committee of the Tramways Committee has recommended that in the event of a Parliamentary Bill being promoted powers should be included for the construction of a line to Elland from Salterhebble, *viâ* Wood Bottom.

Half-Year's Working.—On the Corporation tramways undertaking, during the half-year ended September 30th, there was a profit of £8,611, the income being £61,305, and the expenditure £52,694. On the motor-'buses a profit of £259 had accrued.

Huddersfield.—Half-Year's Working.—In connection with the tramway undertaking the figures for the half-year's working ended September 30th showed receipts of £64,784, and expenditure £34,371, as against £59,606 and £32,443 during the corresponding period of last year. The surplus was £10,677, as against £8,792 a year ago. During the six months £6,883 had been transferred to the reserve or renewal account, which now stands at £22,210.

London.—The Court of Common Council has resolved to oppose the L.C.C.'s proposed tramway extensions in the City, viz, from Aldgate to Aldgate Station; Aldgate to Mark Lane, *viâ* Mansell Street; Charles Street to Blackfriars, *via* Farringdon Street and Ludgate Circus; and from Gray's Inn Road, *via* Holborn and Charterhouse Street, to Farringdon Street.

P.O. Tube Contract.—The Postmaster-General has accepted Messrs. John Mowlem & Co.'s tender for the construction of the tube from Paddington to the Eastern District office, a distance of six miles.

Northampton.—Last week the B. of T. inspected the new route to Far Cotton, and a service was inaugurated on Monday. So far it has proved successful, though handicapped by the fact that the lines have not been laid over the railway, for, it is understood, military reasons.

Preston.—Loans Sanctioned.—The town clerk has received sanction from the B. of T. for the borrowing by the Corporation of £7,000 in respect of car-shed and office extensions, and £5,049 for additional cars.

Stalybridge. — Proposed Additional Powers.—The Joint Board decided on October 22nd to apply for a Parliamentary Act in the next Session giving it power to construct and work additional tramways; to run motor-omnibuses; to enable the Board, with the consent of the local authority, to purchase tramways of the Oldham, Ashton, Hyde and District Tramways, Ltd., and the Hyde Corporation, and to lease such tramways and enter into working agreements; to construct an additional generating station; to extend the area for the supply of electricity, and to enable the Board to borrow further moneys.

West Ham.—The Tramways Committee recommends that sanction be obtained to the laying of double lines of tramway track in portions of Woodgrange Road.

TELEGRAPH and TELEPHONE NOTES.

A Dastardly Scheme.—An attempt was recently made to murder Dr. A. M. Low with a poisoned cigarette. Dr. Low is in charge of a section of wireless telegraphy and field telegraphy, and has paid several official visits to France.

An Alien at the Switchboard.—It has been ascertained that a German arrested at Dunfermline last week was for a time in charge of the telephone department at Rosyth Dockyard. The works are connected by telephone, and the manipulator of the switchboard had every opportunity of listening to the conversations which took place between the various departments of the works, now in an advanced state of construction.

Cable Profits.—The *Financial Times* states that the gross earnings of the Western Union Telegraph Co. increased by $1,380,000 during the quarter just ended, while the surplus at credit of profit and loss account advanced by $1,157,000, due partly to the temporary suspension of code communications in favour of plain-word messages.

Telegrams in Code.—The Postmaster-General announced on Saturday last that the Army Council had agreed to the use of registered addresses in extra-European telegrams, as from the 26th inst. under the following conditions:—

1. The address must have been registered before July 1st last.
2. It can only be used as the address of a telegram; its use as the signature is still prohibited.
3. Telegrams having such addresses can only be sent to, and received from, British or Allied territory in the extra-European telegraph system (and Egypt), or the United States of America.
4. In the case of telegrams to Allied territory or the United States, the full name and address of the addressee must be given on the back of the telegram form.

On Monday a further announcement was made that, as from November 1st, the prohibition of the use of codes would be relaxed, subject to certain regulations. These prescribe that the use of code will only be permitted in telegraphing to British possessions and allied or neutral countries outside the European telegraph system, with the exception of the Argentine Republic, Brazil, Danish possessions, Dutch East Indies, French possessions, Italian possessions, and Angola (Portuguese). The following codes only are authorised: — A B C, 5th edition; Scott's code, 10th edition; Western Union code; Lieber's code. Messages in any other code will be stopped. Neither private supplements nor the numerical equivalents of the phrases in published codes are admissible. All messages in code will be decoded by the Post Office for submission

to the censors. Persons handing in coded telegrams should deposit at the same time translations of the messages. In all cases the name of the code used must be indicated on the form. A fee of 6d. will be charged for each outward telegram in code.

National Revenue.—The returns for the September quarter show revenue from telegraphs £800,000, a decrease of £15,000, and from telephones £1,350,000, a decrease of £285,000, as compared with the corresponding quarter last year.

U.S.A. Wireless Stations.—By direction of President Wilson, the telegraph station of the Marconi Co. at Siasconset, Mass., has been closed, as the company refused to recognise the right of the Government to censor messages. The company had just previously filed suit for an injunction in a Federal District Court of New York, to restrain the naval officers from closing or censoring messages at the station.—*Electrical Review and Western Electrician.*

A suit brought by the Marconi Wireless Telegraph Co., of America, to enjoin the Secretary of the Navy of the United States from further interference with the transmission and reception of wireless messages at the stations of the company located at Sea Gate and Sagaponack, L.I., was argued in the United District Court; the Assistant Attorney-General appeared and argued that the Court had no jurisdiction, and on October 8th the Judge dismissed the Bill on the technicality.—*Telegraph and Telephone Age.*

CONTRACTS OPEN and CLOSED.

OPEN.

Australia.—Melbourne.—December 9th. Victorian Railways. 110 tons of block tin. Contract 27,436. Contractors' Room, Spencer Street.

December 16th. Victorian Railways. Rubber-covered copper wire. Contract 27,705. Contractors' Room, Spencer Street.

December 16th. Victorian Railways. 100 neutral track relays for electrical circuits. Contract 27,712. Contractors' Room, Spencer Street.

December 28th. Victorian Railways. Three 50-kw. static transformers. Contract 27,727. Contractors' Room, Spencer Street.

It is reported by Reuter dispatch from Melbourne that the Melbourne City Council requires electrical plant and material to the value of £71,000 and has resolved to call for tenders for machinery, which must be British made. "No tender in which German or Austrian capital or work is concerned will be entertained."

Adelaide.—December 9th. Telephone instruments and parts, for the Postmaster-General. See "Official Notices" October 3rd.

December 15th. Switchboard, common battery, automatic or semi-automatic, for the Postmaster-General. See "Official Notices" October 9th.

Sydney.—December 9th. P.M.G. Various telegraph instruments and measuring instruments.

December 21st. City Council. Motor-generators and switchgear suitable for electric vehicle battery charging. Specifications, 10s. 6d., from City Electrical Engineer.

Barnes.—The Electricity Committee reports that the coal contracts expire in December next, and owing to the present state of the market it recommends that the electrical engineer be authorised to purchase coal in the open market as and when required.

Blackpool.—November 19th. Corporation. Water-tube boiler, mechanical stokers, economiser, steel chimney, coal-storage hopper, one 1,500-kw. turbo-alternator, surface condenser and auxiliaries. See "Official Notices" October 23rd.

Connah's Quay.—November 6th. U.D.C. (Contract 2) Gas engines, suction gas plant, pipework, cooling tank, dynamos, booster, switchboard, connections and storage battery. (3) Overhead and underground mains, services and public lighting. See "Official Notices" October 16th.

Dublin.—November 5th. G.N. Railway Co. (Ireland). Twelve months' supply of stores, including a number of electrical items. See "Official Notices" October 16th.

November 9th. Dublin United Tramways Co. Twelve months' supply of stores, including car fittings, electric supplies, &c. See "Official Notices" October 23rd.

Hawarden (Flint).—November 11th. R.D.C. Gas engines, suction gas plant and dynamos, switchboard, balancers and boosters, storage battery, underground mains. See "Official Notices" October 23rd.

London.—November 4th. Installation, 235 wiring points, 290 lights, at Senior Street Elementary School, Paddington. See "Official Notices" October 23rd.

Hammersmith.—November 4th. H.T. and L.T. underground electric supply cables, for the B.C. See "Official Notices" October 23rd.

H.M. Office of Works.—November 3rd. Portable electric hand lamps. See "Official Notices" to-day.

Neath.—Coal for a year (2,000 to 2,500 tons of through and through or small steam) for the generating station of the R.D.C. at Court Sart. Mr. G. H. Thomson, Electrical Engineer, 12, Green Street, Neath.

New Zealand.—November 25th. Public Service Stores Tender Board, Wellington. 50 miles insulated and braided wire, twin twisted; 7,000 dry cells for telephones.—*Board of Trade Journal.*

Gisborne.—December 5th. Borough Council. Direct-current meters for electric lighting. (Deposit £25, to Town Clerk.) Specifications, &c., may be seen at Board of Trade Commercial Intelligence Department in London.

Tunbridge Wells.—November 7th. Corporation. 12 months' supply of H.T. and L.T. cables. See "Official Notices" October 9th.

Wakefield.—December 4th. Yorkshire (W.R.) Electric Tramways Co., Ltd. Twelve months' supply of electric lamps, fittings, insulating materials, &c. Schedules can be obtained from the Central Offices, Belle Isle, after November 9th.

Wigan.—November 11th. T.C. 40 electric torches for the police. Mr. John S. Percival, Chief Constable.

York.—November 9th. Construction of about 1½ miles of light railway, excluding overhead electrical equipment, for the T.C. Mr. F. W. Spurr, City Engineer (returnable deposit of £5).

CLOSED.

Australia.—An Australian paper states that the tender of the Automatic Telephones (Australasia), Ltd., has been accepted by the Postmaster-General for the supply and erection of automatic switchboards in the telephone exchanges at Randwick, Mosman, Parramatta, Ashfield, Burwood, Homebush, Lidcombe and Watson's Bay, which are all in the Sydney network; £101,115 is involved. The switchboards are manufactured in the United States.

Barnsley.—The Electricity and Lighting Committee has accepted the tender of the Paterson Engineering Co., Ltd., amounting to £55, for alterations to existing water-treatment plant.

Bradford.—The Electricity Committee has accepted the tender of Messrs. Ferranti, Ltd., at £373, for the supply of five static transformers.

The Guardians have been recommended to accept the tender of Mr. Charles Bell, at £90, to carry out outside electric lighting at the St. Luke's Hospital.

Cardiff.—Messrs. Venner Time Switches, Ltd., have received a repeat order from the Corporation for 49 time switches.

Cleckheaton.—The U.D.C. has accepted the tender of the Union Cable Co. for 880 yards of cable for house services; and that of Messrs. Siemens Bros., Ltd., for feeder pillars.

Derby.—The Borough Education Committee has accepted the tender of Messrs. Newton Bros. for the electric light installation at the Girls' Secondary School, at £198.

Eastbourne.—The following is a list of the firms who submitted tenders for switchboard for the Corporation Electricity Department:—

Electric Construction Co.
Siemens Bros.
Spagnoletti, Ltd.
Switchgear & Cowans (accepted) £1,026
Crompton & Co.
British Westinghouse Co.
General Electric Co.
British Thomson-Houston Co.
Bertram Thomas.
Ferguson Pailin & Co.
Johnson & Phillips.
Cox-Walkers.

India.—The Commissioners of the Port of Calcutta have accepted the tender of Messrs. Pyne Hughmann & Co. for electric cranes at £12,100.—*Indian Industries and Power.*

Liverpool.—The Tramways and Electric Power Committee recommends the acceptance of the offer of Messrs. J. Henshaw & Sons to carry out the work in connection with the reconstruction of the second section of the boiler-house of Lister Drive No. 1 power station.

London.—Poplar.—The Electricity Committee has recommended the acceptance of the tender of Messrs. Fairweather and Ranger, at £1,133, for the construction in reinforced concrete of stores for the department.

Southwark.—The tender of Messrs. G. Hinchliffe & Co. has been recommended to the Borough Council for acceptance for the supply to the electric light station of 10,000 tons of various descriptions of coal, at 12s. 7d. per ton.

It is announced in the *Times* that the Postmaster-General has accepted the tender of Messrs. John Mowlem & Co., Ltd., for the construction of the railway tunnel from Paddington to the Eastern District Office, authorised by the Post Office (London) Railway Act, 1913, for the conveyance of mails.

The London Education Committee has received the following tenders for the installation of electric lighting at two schools:—

		Gifford Street.	Vallance Road.
Foote & Milne, Ltd.	(accepted)	£354	£504
T. W. Vaughan & Co.		383	531
Defries & Goldman		393	595
Kent & Co.		395	651
Tyler Apparatus Co., Ltd.		397	547
G. P. Aleen & Co.		404	—
J. & F. May		427	649
G. Weston & Sons, Ltd.		435	—
Lund Bros. & Co.		441	—
Tredegar & Co.		442	644
A. Hawkins & Sons		449	619
Alpha Mfg. Co.		450	—
Hill & Harrington, Ltd.		456	—
Duncan Watson & Co.		468	715
Derry & Toms		—	564
Northern Electric Co.		—	599
Arthur Newman		—	655
H. J. Cash & Co.		—	706
The Petrolite Lamp Co.		—	849

Stepney.—The Electricity Committee reports the acceptance of the following offers of coal:—A. Blackmore & Co., 200 tons Lanarkshire washed peas, 14s. per ton; Shipping and Coal Co., Ltd, 103 tons of Cowpen nuts, 14s. 9d. per ton; Spenser Whatley, Ltd., 110 tons Warwickshire peas, 13s. 9d. per ton.

Luton.—The Town Council has been recommended to accept the tender of Messrs. Hayward-Tyler & Co., Ltd., at £120, for a feed pump in connection with the electricity station extensions.

Mansfield.—The Education Committee has accepted the tender of the Mansfield Engineering Co., amounting to £108 10s., for electric lighting installation at Rosemary Boys' and Girls' Schools.

Rochdale.—Contracts for the supply of 15,000 tons of coal for the electricity works have been placed, the price agreed upon showing a reduction of just over 2s. 6d. per ton. Last year the price averaged 13s. 9d. a ton; now it is about 11s. 2d.

Salford.—The following tenders have been accepted by the Tramways Committee:—

Bayliss, Jones & Bayliss, Ltd.—2,000 single-ended tie-bars, £11 12s. 6d. per ton; 2,500 double-ended tie-bars, £12 per ton—plus 3s. per ton for cartage in both cases.
Hadfields, Ltd.—24 manganese-steel points and 12 manganese-steel crossings, £528.
Titan Trackwork Co., Ltd.—Eight manganese-steel points and four manganese-steel crossings, £173.
Walter Scott, Ltd.—500 tons Sandberg steel tramway rails, £7 15s. per ton, plus 2s. per ton for cartage.

The following tenders have been accepted by the Electricity Committee:—

J. Wolstenholme & Son.—4-in. steel piping with cast-iron flanges, £67.
Bradley & Lonsdale.—Erection of gangway over condenser pit, £29 10s.
Buxton Lime Firms Co.—Lime, 26s. per ton.
J. J. Knight.—Additional office, gangway, &c., at the electricity station, Frederick Road, £140.

Warrington.—The Electricity Committee has accepted the tender of Messrs. Johnson & Phillips, Ltd., at £430, for cables.

Woolwich.—The tender of the British Westinghouse Co. has been accepted by the B.C., at £135, for a 200-K.V.A. transformer.

FORTHCOMING EVENTS.

Institution of Mechanical Engineers.—Friday, October 30th. At 8 p.m. At Storey's Gate, S.W. "Thomas Hawksley" Lecture.

North-East Coast Institution of Engineers and Shipbuilders.—Friday, October 30th. At 7.30 p.m. At Bolbec Hall, Newcastle-upon-Tyne. General meeting.

(**Graduates' Section**).—Saturday, October 31st. At 7.15 p.m. At Bolbec Hall. Address by Mr. E. L. Champness.

Institution of Municipal Engineers.—Saturday, October 31st. Eastern and North-Eastern District meeting, Lincoln. At 11.45 a.m. At Guildhall. Business meeting; luncheon. Afterwards visits to various undertakings, including, at 2.45 p.m., electricity works and tramway undertaking.

Society of Engineers.—Monday, November 2nd. At 7.30 p.m. At Institution of Electrical Engineers, Victoria Embankment, W.C. Ordinary meeting.

Institution of Electrical Engineers (Manchester Local Section).—Tuesday, November 3rd. At 7.30 p.m. At Engineers' Club, Albert Square. Chairman's address, by Mr. P. P. Wheelwright.

(**Yorkshire Local Section**).—Wednesday, November 4th. At 7.15 p.m. At Hotel Metropole, Leeds. Opening meeting and smoking concert.

Rontgen Society.—Tuesday, November 3rd. At 8.15 p.m. At Institution of Electrical Engineers, Victoria Embankment, W.C. Presidential address, by Sir A. P. Gould.

Institution of Civil Engineers.—Tuesday, November 3rd. At 8 p.m. At Gt. George Street, S.W. Presidential address, by Mr. B. Hall Blyth.

Salford Technical and Engineering Association.—Saturday, November 7th. At 7 p.m. At Royal Technical Institute, Peel Park. Short papers by members (for gold medal).

NOTES.

The "Electrical Review" during War Time.—For the convenience of any of our readers who may be serving with the naval or military forces, either in camp or elsewhere, we have pleasure in announcing that any electrical or engineering unit or individual electrical man will be provided with a copy of the Electrical Review regularly every week as long as the war lasts if the Manager, the Electrical Review, 4, Ludgate Hill, E.C., be furnished with the name and address to which it is to be sent.

The William White Memorial.—The *Times* states that nearly £3,000 has been subscribed to the Sir William White Memorial Fund, and the principal part of the fund is to be devoted to the establishment of a scholarship for research work in naval architecture.

Fire Prevention.—The British Fire Prevention Committee has issued a special fire warning for buildings in which Belgian refugees are being temporarily housed, printed in English, French and Flemish. Copies can be obtained upon written application (giving requirements as to language) addressed to the Registrar, the British Fire Prevention Committee, 8, Waterloo Place, London, S.W.

French Red Cross Society.—The French Committee formed for the assistance of dependents of local residents who have joined the Colours of our Allies, has also undertaken to collect funds for the French Red Cross Society, which is now in very urgent need of assistance. The resources of this society have been overwhelmed by the needs of the wounded from the enormous battle area. The numbers of wounded to be dealt with increase daily, and, of course, British, Belgians, French and Germans are all ministered to alike. The expense incurred is naturally excessive, and is altogether beyond the ordinary resources of this society, and an urgent appeal is made to this country for assistance. Donations may be sent to Mr. A. Reyrolle, care of A. Reyrolle & Co., Ltd., Hebburn-on-Tyne, who is a member of the Local French Committee.

Diesel Electrical Locomotive Cars.—On the railway line between Rastatt and Gernsach, in Saxony, some experiments have been made with the running of the first Diesel electrical locomotive cars constructed in Germany. The car is built to accommodate 100 persons, and has a cab for the driver at each end. It is mounted on two bogie-trucks. On one of these is carried the Diesel engine, by which the energy is supplied, and which is coupled direct to a dynamo; on the other, which has two axles, are installed two electromotors, for the propulsion of the car. The Diesel set has a capacity of 147 KW. and runs at 450 R.P.M. The six cylinders are of the four-cycle type and are arranged in a kind of V, each three of the same side being placed at an angle of less than 30° to the vertical. The internal diameter of the cylinders is 260 mm., and the stroke is 300 mm. The speed under the control of the driver can be reduced to about 200 R.P.M.

The trials made with these new cars were very successful, and a speed was achieved of 75 km. or 45½ miles per hour. The running of the cars was very quiet, and there was scarcely any vibration.

The mechanical parts of the cars were supplied by Messrs. Sulzer Bros., and the electrical parts by the A.G. Brown, Boveri & Cie. The State Railways in Saxony have placed orders for a number of new cars of this type, and the example has been followed by the Prussian State Railways. The price is considerably higher than that of ordinary motor-cars, but this is counter-balanced by the decreased cost of running of the electrical cars. A comparison is being made with cars of British manufacture; these have been run over a distance of 1,600 km., and the average consumption amounted to 0·21 pfennig per km. This works out on the basis of price of energy of 1·06d. per KW.-hour at 0·31d. per km., a result which it would be impossible to approach with other types.

Simpler Control for Rolling-Mill Motors.—In a paper read before the American Association of Iron and Steel Electrical Engineers, W. Sykes and G. E. Stotz plead for simpler controllers on rolling mill motors. The motors themselves have been so perfected that trouble with them arises only under extraordinary circumstances, but, to reduce the risk of overloading the machines while accelerating the heavy rotating parts of the mill drive, complicated automatic controllers have been introduced which not infrequently introduce more maintenance troubles than they remove. Interlocks and a multiplicity of contacts and relays should be avoided, as far as possible, in favour of manual operation by proper attendants. Rolling mill motors necessarily carry high momentary peak loads, hence it is difficult to protect them against long continued moderate overloads. Ordinarily, the speed drop of an induction motor from light to full load is only 2 or 3 per cent., which does not permit a fly-wheel to relieve appreciably peak loads on the driving motor. A liquid slip regulator, providing 10 to 15 per cent., or greater speed drop on full load, permits the fly-wheel to become usefully operative, and maintains more uniform load on the motor than is possible where step-by-step grid resistances and switches are used. As compared with a controller and fixed slip arrangement, a liquid slip regulator effects very important reductions in the maximum power required for rolling; this saving becomes more considerable the smaller the fixed slip, and in a particular case the use of a liquid slip regulator reduced the maximum demand 30 per cent. and 40 per cent., as compared with the demand when rolling with 11 per cent. and 6 per cent. fixed slip respectively.

The Insulating Properties of Solid Dielectrics.—In the scientific papers of the Bureau of Standards, U.S.A., an account is given by Harvey L. Curtis of a research on the volume resistivity and the surface resistivity of dielectrics. The volume resistivity of a material is the resistance in ohms between two opposite faces of a centimetre cube. The surface resistivity is defined as the resistance between two opposite edges of a centimetre square of the surface film which is deposited upon the material.

In measuring the volume resistivity, mercury electrodes were employed in order to make good contact, and a guard-ring was used to prevent any errors on account of surface leakage. Some values of the volume resistivity are given below :—

VOLUME RESISTIVITY OF SOLID DIELECTRICS.

Material.	Resistivity. ohms-cm.	Material.	Resistivity ohms-cm.
Special paraffin ..	over $5{,}000 \times 10^{15}$	Paraffined mahogany ..	40×10^{12}
Ceresin	over $5{,}000 \times 10^{15}$	Stabilite	30×10^{12}
Fused quartz ..	over $5{,}000 \times 10^{15}$	Plate glass	20×10^{12}
Hard rubber	$1{,}000 \times 10^{15}$	Bakelite No. 150.. ..	4×10^{12}
Clear mica..	200×10^{15}	Opal glass	1×10^{12}
*Sulphur	100×10^{15}		
*Amberite..	50×10^{15}	Paraffined poplar ..	500×10^{9}
*Rosin	50×10^{15}	Paraffined maple ..	300×10^{9}
*Mica (India ruby slightly stained)	50×10^{15}	Bakelite No. 1	200×10^{9}
Mica (brown African clear)	20×10^{15}	Bakelite No. 190	100×10^{9}
Bakelite L558	20×10^{15}	Italian marble	100×10^{9}
*Electrose No. 8 ..	20×10^{15}	Vulcabeston	20×10^{9}
*Shellac	10×10^{15}	White celluloid	20×10^{9}
*Sealing wax	8×10^{15}	Hard fibre..	20×10^{9}
*Yellow electrose ..	5×10^{15}	Black galalith	20×10^{9}
*Yellow beeswax ..	2×10^{15}	White galalith	10×10^{9}
Khotinsky cement ..	2×10^{15}	Red fibre	5×10^{9}
*Moulded mica	1×10^{15}	Marble, pink Tennessee	5×10^{9}
		Marble, blue Vermont..	1×10^{9}
Unglazed porcelain ..	300×10^{12}	Ivory	200×10^{6}
Black electrose : ..	100×10^{12}	Slate	100×10^{6}
Mica (India ruby stained)	50×10^{12}	Bakelite No. 140.. ..	20×10^{6}
German glass	50×10^{12}		

* Apparent resistivity taken after the voltage had been applied for 15 minutes.

Upon the surface of all insulators except the waxy materials a film of moisture collects from the surrounding air. The thickness and conductivity of this film depends upon the material of which the insulator is composed and upon the relative humidity of the surrounding air. For some materials the surface resistance at 1 per cent. humidity is 10^{11} times larger than at 95 per cent. humidity, though for the majority of materials the surface resistance does not change by a factor of more than 10^{6} under these conditions. Since the change is not uniform, it has been found necessary to construct curves showing the change of surface resistivity with humidity. These curves are given in the original article.

Electrical News in German Papers.—The *Electrical World* of October 10th contains the following note regarding the *E.T.Z*, which, of course, no longer reaches us :—

"In the *Elektrotechnische Zeitschrift* of September 10th (Nos. 36-37, containing 20 pages of text and 20 pages of advertisements) there is a note on 'War and Industry,' signed by the initials of the editor (Mr. C. Zehme), referring to a statement of the commander-general of the Seventh Army Corps of the German army to the inhabitants of the provinces of Rhineland and Westphalia. In this statement it is emphasised that Germany needs its men not only for the war but also for maintaining some of the most important industries ; that in order to make a successful issue of the war possible it is necessary above everything else to keep the coal mines of the district in full operation and in the same way the metallurgical works making war materials ; but that it is also necessary to keep open the boat traffic in the River Rhine, the mills, the waterworks and electric central stations.

"It is pointed out by the editor that the electrical industries have lost 25 to 30 per cent. of their employés, who have gone to the front. Some departments of the industries had to be restricted, others had to be extended in operation. The editor thinks that in view of the importance of keeping the electrical industries in full swing, the recent raise of price made by several of the German electrical manufacturing companies is of doubtful economic soundness.

"Under trade notes it is stated that the Gottfried Hagen Storage Battery Co, in Cologne, has raised the price of plates and batteries by 10 per cent. as a result of the rise in price of lead.

"On the front page the editors and publishers make the following announcement: 'On the supposition that the mail facilities permit it, one number of the *Elektrotechnische Zietschrift* will be issued at least every two weeks. We hope that political conditions will soon enable us to resume the issue of weekly numbers and in any case to bring the current yearly volume to a complete conclusion.'"

The I.M.E.A. and the Ilford Case.—The Willesden Electricity Committee has received a request from the I.M.E.A. asking for financial assistance in defending proceedings instituted by a gas company against the Ilford Council in respect of alleged preferential treatment. The Committee states that it is advised that the Council has no power to comply with such request, and it recommends that the Association be so informed. In this connection, Bradford Electricity Committee has decided to contribute a sum not exceeding £50, and Salford Electricity Committee a sum not exceeding £20 towards expenses.

B.E.A.M.A. Annual Dinner.—The Council of the B.E.A.M.A. decided, at the last meeting, not to hold the usual annual dinner this session.

Electricity in the Iron and Steel Industry.—Statistical data showing an immense increase in the use of electricity in the iron and steel industry of the United States were presented by R. Tschentscher, at the Cleveland Convention of the Iron and Steel Electrical Engineers. Inquiries were sent to 85 companies operating from 1 to 33 plants (200 installations in all), and replies were received from 62 companies, operating 175 plants. Of these companies, all but three generate their own current, and a summary of the data collected reads as follows :—

No. of generating stations ...	170
Generating sets—No. of ...	840
KW. capacity	394,500
Motors.—No. of	45,510
H.P.	1,261,150 H.P.
Load—Lighting	33,863 KW.
Metallurgical	7,047 KW.
Miscellaneous	4,810 KW.
Units.—Purchased in 1913 ...	7,800,000 KW-hours
Generated „ „ ...	1,633,764,000 KW.-hours
Average do. per plant...	9,610,000 KW.-hours

The total KW.-hours generated during 1913 in individual plants ranged from 100,000 up to 330 millions, and three companies alone in their 19 plants generated 683 million units, *i.e.*, 42 per cent. of the total. The largest and next largest electrical equipments accounted for 20 per cent. and 8 per cent. respectively of the total output from the whole 170 plants reported.

Nothing could show more clearly the immensity of the remaining possible electrical applications in existing iron and steel works—applications which will doubtless be made, as present plant becomes obsolete or worn out, and as competition demands that advantage be taken of the economies of electric driving.

There are from 225 to 250 separate iron and steel works in the States, and, excluding mining, making and handling of raw materials and transport of the latter, their total electric power production was approximately 2,000 million units in 1913, say an average of 9,000,000 units per plant, as compared with the 1912 census averages of 4·8 million units for each of the 1,260 electric railway companies and 2·2 million units for each of the 5,221 central stations (including railway and lighting) in the States.

Allowing for light load, metallurgical and miscellaneous load, and on the basis of 6,400 working hours per annum, the generator power for motor load in the steel industry is 236,000 KW. This correspondends to an average motor load factor of 20 per cent., and it is probable that load factors between 15 per cent. and 25 per cent. cover all average conditions in the iron and steel industry. The consumption of electrical energy in iron and steel works in the States is about 20 times as great as it was 10 years ago—a record of development approached in no other single industry.

Banks and Government Contracts.—The opinion is held that greater facilities might be afforded by banks in the present position of affairs to many firms who have secured contracts with the Government if the latter would accept from the banks notices of the charges by customers against such contracts, and would pay the moneys due from time to time direct to the banks on the order of the customer. This would better enable banks to make advances in respect of such undertakings. At present the Government declines to do this. The banks, it is said, are anxious to finance these contracts, and they are taking exceptional risks to assist their customers, but naturally they are not disposed to run risks which might be difficult to justify unless the Government assists them in the manner indicated.—*Times.*

Electromagnets for War Surgery.—At the recent meeting of the French Academy of Medicine, Dr. A. Dastre explained the uses to which a powerful electromagnet could be put in removing shrapnel splinters and steel-jacketed bullets from wounded soldiers. It is claimed that an electromagnet used by Prof. Rolet drew shrapnel fragments to the surface from a depth of 6 in., and bullets from a depth of 2½ in.—*Electrical World.*

America Appoints More Trade Consuls.—In view of the exceptional activity of the United States Department of Commerce, and the Consular officers under their control, in investigating fresh business opportunities arising from the war, it is of interest to note that seven commercial attachés have been appointed by the department "to undertake the new service of American trade promotion abroad." Mr. A. H. Baldwin, who has been appointed to London, was during the past four years chief of the Bureau of Foreign and Domestic Commerce. Dr. Veditz, who will go to Paris, has been expert investigator to the United States Government, after having filled the Professorship, at several American Universities, in Economics, which subject he studied extensively on the Continent. The special qualifications of the attaché at Berlin (Mr. E. W. Thompson) are mill designing, and the manufacture of cotton goods and cotton seed products. The other appointments are to Pekin (Mr. J. H. Arnold), Buenos Ayres (Dr. A. Hale), Rio de Janeiro (Mr. L. Hutchinson), and Lima (Mr. A. Harrington).

Inquiries.—A correspondent wishes to know whether balata is suitable for use in electrical manufactures, and to what extent cheap rubber will affect the demand for gutta-percha and balata.

Names of firms to stamp out the metal frames of cheap electric bells, and makers of wood bases and gongs for bells, are wanted.

Inquiries are still being received for British makers of pocket-lamp batteries, of whom we know only a few ; if any other firms have taken up this line we shall be pleased to hear from them.

Institution and Lecture Notes.—Institution of Electrical Engineers.—The 1914-15 Syllabus of the Manchester Local Section contains the following items :—

November 3rd, 1914.—Chairman's Address by Mr. P. P. Wheelwright.
" 17th.—"Cables." By Mr. C. J. Beaver.
December 1st.—"Power Plant Testing." By Mr. W. M. Selvey.
" 15th.—"Automatic Protective Switchgear for A.C. Systems." By Mr. E. B. Wedmore.
January 12th, 1915.—"Conditions Affecting the Variation in Strength of Wireless Signals." By Prof. E. W. Marchant.
" 26th.—"Electric Furnaces." By Mr. T. D. Robertson.

The following provisional programme for the session 1914-15 has been drafted by the Scottish Local Section :—

November 10th, 1914, (Glasgow).—Chairman's Inaugural Address.
December 8th, " (Glasgow).—Paper on "The Magnetisation of Iron at High Flux Density with Alternating Currents." By Mr. J. S. Nicholson, B.Sc.
January 12th, 1915, (Edinburgh).—Paper on "Cables." By Mr. C. J. Beaver.
February 9th, " (Glasgow).—Paper on "Distribution and Rise of Temperature in Field Coils." By Prof. M. Maclean, Mr. D. J. M'Kellar and Mr. R. S. Begg.
March 9th, " (Edinburgh).—Paper on "Automatic Protective Switchgear for Alternating-Current Systems." By Mr. E. B. Wedmore.
April 12th, " (Glasgow).—Annual General. Paper on "Power Plant Testing." By Mr. W. M. Selvey.

Owing to the war it has been decided not to have the annual dinner and smoking concert, and there will be no meetings of the Students' Section this session.

Institution of Engineers and Shipbuilders in Scotland.—The report of the Council for the past Session shows that the membership at September 30th was 1,669. The treasurer's statement shows surplus revenue £202, and total assets £33,239. The "James Watt" anniversary dinner will not be held this year.

Igranic Engineering Society.—The first meeting of the Session was held on the 21st inst. The chair was taken by the President (Mr. G. A. Mower), and Messrs. A. H. Curtis and J. H. Mould were elected vice-presidents. Addresses were given by the President and Mr. Mould on the effect of the war on the electrical industry. Mr. J. T. Mould's remarks were devoted largely to the commercial effect of the war, and to a review of the opportunities afforded by the present situation to secure those markets for electrical apparatus which had been in the hands of German manufacturers and exporters. If the whole of the German markets were captured, our exports of electrical apparatus could be doubled; the field was promising, provided that the necessary sustained and well-directed spade work was carried out and a careful study made of the exact requirements and business methods of the markets now made available. Reference was made to the Roll of Honour of the Igranic Electric Co., on which appeared the names of 100 employés serving with H.M. Forces, and 11 members of the staff who had recently joined the Colours were elected hon. members of the Society.

Association of Electrical Station Engineers.—A meeting of the London Branch was held at Stone's Restaurant, Ludgate Hill, E.C., on Tuesday last. The general secretary reported that the London branch secretary had handed in his resignation, which had been accepted by the London Committee, and the general secretary would undertake the London Branch work for the time. He also reported that one of the trustees and two of the London committee had enlisted in the Army, as well as a large number of the members (a full list was being compiled). It was agreed that those members who had undertaken military duties should be relieved from payment of their subscriptions during their period of service, and they should retain full membership. The secretary pointed out that it was the duty of those who still continued their usual occupations to pay up all arrears of subscriptions, to make up for the large loss entailed, and to keep the Association on a firm footing, financially and otherwise. The conference originally arranged for October 3rd has been postponed indefinitely.

The Secretary also stated that he had received large numbers of applications from engineers and others for men to fill various vacancies (for the period of the war) but except in a few cases early in August had been unable to supply men; the difficulty in some cases had been overcome by overtime. There was a shortage of skilled men for the supply side of the industry under present conditions, and there was a feeling that unskilled men were being put into responsible positions. There was no doubt that this was happening in a few cases, but the Association proposed to take no action in the matter, as most were only engaged during the period of the war. On the return of members from active service their interests would, of course, come first; in most cases reinstatement was sure.

The next meeting of the London Branch will be held on November 17th, as above.

Fatality.—An inquest was held on the 19th inst. at Parkhurst, I.O.W., on Edward Belcher, a Territorial bandsman, who was killed through an explosion in an electric inspection chamber in St. James's Street, Newport. During the previous Saturday evening a foreman in the Electric Light Co.'s employ replaced a fuse in a feeder-pillar in the market, and simultaneously the explosion occurred in the inspection pit; the cover being blown into the air fell on the head of Belcher, who was dead when picked up. Efforts to elicit the cause of the explosion failed, and the jury returned a verdict of "Accidental Death," adding that the chamber covers should be lifted at least once a week as a precaution.

Patents and Alien Enemies.—Applications have been lodged for the avoidance or suspension of the following patents :—

No. and year of patent.	Name of grantee.	Short title.	Name and address of applicant.	Date of hearing.
362/13 25,719/13	Hinselmann Gebrüder Hinselmann	Jig conveyers	E. Mills, 9, Harper Street, Willenhall, Staffs.	Nov. 5th
19 369/11 19,370/11	Julius Pintsch A.G.	Apparatus for flashes of light	Pintsch's Patent Lighting Co., Ltd., Friars House, New Broad Street, London	Nov. 6th
3,561/13	Julius Pintsch A.G.	Railway signalling	Pintsch's Patent Lighting Co., Ltd.	Nov. 6th
8,585/13 8,586/13	Julius Pintsch A.G.	Lighthouse lamps for aerial navigation	Pintsch's Patent Lighting Co., Ltd.	Nov. 6th

The following cases have been decided :—

No. and year of patent.	Name of grantee.	Applicant.	Decision.
20,922/12 23,150/12	"Vulkan" Maschinenfabriks Akt.-Ges.	Glenfield & Kennedy, Ltd.	Application refused.

Late Correspondence.—We have received the following letter :—

Spagnoletti, Ltd.—From several sources in the trade it has come to our knowledge that the above company is said to be financed by Germans, or else supplies goods of foreign origin and manufacture.

Some months before the war broke out our company, the Park Royal Engineering Works, Ltd., was formed with the object of acquiring and extending the business of Spagnoletti, Ltd., by providing the necessary fresh capital to build and equip a modern up-to-date factory. With this object in view, we purchased forthwith, and still hold, all the debentures and practically all the shares of Spagnoletti, Ltd. We also at once commenced the building of the new factory at Park Royal, and but, in the first instance, for the builders' strike, and subsequently, on the declaration of war, for the pressure of Government orders, our scheme ere now would have been completed, and the business of Spagnoletti, Ltd., non-existent under that name.

Every member of the board, debenture-holder and shareholder of the Park Royal Engineering Works, Ltd., is a British subject. Further, the managing directors, staff, and all workmen employed by both companies are English, and the material used and the goods produced are solely of British design and make.

One of the managing directors, Mr. J. Lothian Nicholson, a son of the late General Sir Lothian Nicholson, Governor of Gibraltar, has four brothers at the present moment at the front, two in the Army and two in the Navy, while a fifth brother, serving in the Indian Army, may shortly also be joining his other brothers at the front.

In addition to the damage done to both companies by these base and groundless rumours it is needless to point out how painful it is to Mr. Nicholson to hear it even suggested that his company is in any way connected with his country's enemies.

We shall be very much obliged to anyone who can give us any further information as to the source of these rumours, in order that we may at once take legal steps to prevent their repetition.

The Park Royal Engineering Works, Ltd.,
Arthur G. Morrish, *Chairman.*

London, E.C., *October 27th*, 1914.

Wimbledon Lighting.—The T.C. Electricity Committee recommends the purchase of land in Coombe Lane, from the Metropolitan Water Board, as a site for a transformer sub-station at £600. The Committee also recommends the Council to contribute £10 towards the costs of the Ilford U.D.C. *v.* Gas Co., provided equal support is given by other local authorities owning electricity undertakings.

The Council is recommended to contribute £5 towards the cost of the Joint Private Bill, promoted by the I.M.E.A., for the purpose of obtaining increased powers with regard to electric lighting.

Consular Notes.—*Packing Lamps for Export.*—The United States Consul at Rio de Janeiro makes a suggestion as to the method of packing incandescent lamps, which he thinks may contribute to better sales. Dutch and German lamps have been replacing those of American manufacture. The latter are usually packed separately in corrugated paper jackets, and then in large wooden cases. The Dutch lamps are protected with similar corrugated paper jackets, but the packing case, instead of being wood, is a cardboard carton holding 100 lamps. On board ship such packages are assigned to a special part of the ship, where they will not be crushed by heavier cases. By adopting a similarly inexpensive type of packing, the Consul thinks lamp shippers could sell at a more competitive price.

Openings for Fans in India.—The American Consul understands that in connection with the large amount of building to be done at Delhi the authorities are considering the possibility of constructing buildings with inner as well as outer walls, between which artificially cooled air can be circulated by means of exhaust fans. The use of electric fans in India is constantly increasing. Ceiling fans which will operate directly over a person's bed and force air through the mosquito netting, or over the dining table, or over the business man's desk, are the most popular type. Fans of the table type, usually attached to walls, are much used in theatres and such places, where it is desired to force a current of air along particular directions. There is a very big demand for all types of fans, for direct and alternating current, and for ceiling, table, desk and wall use.

OSAKA.—The British Vice-Consul at Osaka reports that the completion of the works of the Ujigawa Hydro-Electric Power Co. in June, 1913, came at a time most fortunate for the company, coinciding as it did with a period when the high price of coal had become a matter of concern to all industries using steam power. The company supplies power to both Osaka and Kyoto, the power house being situated at Uji (about 9 miles from Kyoto and 22 miles from Osaka), from which point the three-phase, 60-cycle, alternating current is transmitted by aerial lines to Osaka, at a pressure of 55,000 volts, and to Kyoto at 11,000 volts. A contract has been made with the Osaka municipality for the supply of power for the tramway service from January, 1915, which will account for 4,000 KW. The company's tariff ranges from 4½ sen (1·1d.) to 3 sen (¾d.) per KW.-hour, though contract prices appear to be considerably lower. The growth of electric railway systems continues. In April this year there were within a radius of 50 miles of Osaka close on 250 miles of double track in operation and 80 miles more under construction or proposed in the near future.

CEYLON.—*Graphite.*—According to the recently issued Colonial Office Report on Ceylon, there are about 450 plumbago mines in the colony. Last year the market was dull, especially during the closing three months, but prices showed an appreciable advance on those realised in 1912. The averages per ton for large and ordinary lumps rose from Rs. 376 to Rs. 441 (Rs. 15 = £1), and for chips and dust from Rs. 210 to Rs. 270. The quantity shipped amounted to only 571,000 cwt., against 655,000 in 1912. The United States took over 20,000 cwt. less than in 1912, and Germany 40,000 cwt. less, whilst exports to the United Kingdom showed little change. Last year, in addition to the competition of the Korean product, another competitor made itself felt in the shape of the Madagascar product.

Import Trade.—Next to British India, the United Kingdom continues to be the chief source of supply of imports generally into Ceylon, her percentage of the total import trade last year being 29·2, as compared with 28·76 in 1912. The position which we have thus maintained against foreign competition appears, therefore, satisfactory. At present the United Kingdom possesses exactly nine times the trade of Germany—her greatest foreign rival. Imports of lamps into Ceylon last year showed more than a 50 per cent. increase.

A recent report by the United States Consul at Colombo says that plumbago miners and dealers are suffering from a slump in the market. There is an impression that the rivalry in foreign markets, which the increased output of plumbago in Madagascar has created, threatens to drive Ceylon plumbago from the markets of the world. Inquiries into the Madagascar industry are being made by Ceylon interests, and Government assistance in further investigation is being requested. A comparison of samples indicated that whilst the Madagascar quality was not so good as the two best Ceylon qualities, it was well above the average. If the Madagascar output continues, Ceylon dealers are of opinion that the only way to compete against it is to import modern mining machinery into Ceylon, and go into plumbago mining on a scientific basis, which has never yet been done.

Another view which has been advanced is that present conditions are not due to Madagascar competition, but the unsettled state of the general situation throughout the world. There would be far more plumbago from Ceylon going into consumption now were it not for the wild speculation in the mineral last year by numbers of small dealers, who cannot afford to sell at the prices now ruling without making heavy losses.

Walking Contest.—The Hackney Walking Club are holding a 20 miles scratch walking race on Boxing Day, open to all amateurs, starting and finishing at the Cross Keys Hotel, Lower Edmonton. The route will be the main road to Hoddesdon and back again; prizes will be given, and no entrance fees will be charged. As several members of the club are serving their country a large entry is not expected, but the Committee feel that events should be arranged to cater for those at home. Owing to the death of Mr. S. C. Haynes, the hon. sec., all communications should now be addressed to Messrs. L. H. and S. H. Smith, 136, Inderwick Road, Hornsey, N., the hon. secs., *pro tem.*

Appointments Vacant.—Switchboard attendant (32s.), for Burnley Electricity Department; assistant engineer (35s.), for Rampton Criminal Lunatic Asylum, Retford; a few first-class telephone mechanics and instrument makers, for R.E. Stores, Royal Dockyard, Woolwich; engineers (mechanical and electrical), for the Cornwall (Fortress) Royal Engineers, Electric Light Co. (Territorial); junior charge engineer (£80), during war, for Crewe Corporation. Particulars are given in our advertisement pages.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—Whilst making a tour of inspection of sub-stations on September 11th, MR. ARTHUR DOUGLAS BROADBENT, youngest brother of Mr. Frank Broadbent, and chief assistant engineer to the municipal electricity department of Perth, West Australia, was shot in the back by some unknown person and very seriously wounded. The outrage took place in the main street of Maylands, a suburb of Perth, in daylight, but the assailant apparently was not seen by any one. No motive for the attack is known. The latest information to hand showed that Mr. Broadbent was in a critical condition.

MR. W. T. LE FEUVRE, borough electrical engineer at Bexhill, who was formerly lieutenant in the 2nd Home Counties Royal Engineers (Territorials), having applied for a commission in the army, the Council have agreed to keep his post for him and to allocate his salary as follows:—£225 per annum to Mr. Le Feuvre's wife and family; £100 per annum to the assistant-engineer, Mr. Frost; £100 per annum for the provision of any further engineering assistance should this be found necessary.

Hackney B.C. last week selected for the appointment of generating engineer MR. F. D. OSBORN, at present assistant shift engineer. There were 42 applicants.

MR. W. H. WELDON, who has for several years been engaged in the Bridlington Corporation electricity works, has received an appointment under the Government at the Curragh Camp, Ireland. His colleagues at Bridlington have made him a presentation of a solid silver cigarette-case.

MR. EUGENE MATHEWS, the testing engineer at the Hackney electricity works, and secretary of the Hackney Electric Rifle Club and also of the Electricity Supply Rifle League, was married on the 19th inst., at Leyton parish church, to Annie Dorothy, only daughter of Mr. and Mrs. George Harry Hallam, of Leyton.

MR. A. J. BRIDGE, who is at present employed in the electricity supply department at Sheffield, has been appointed junior engineer-in-charge at the Darlington Electricity Works.

According to a Maidstone paper, the Maidstone Town Council in Committee recently resolved that the electrical engineer be requested to refund any bonus received by him for the past year in excess of the £500 limit fixed in 1910. There are two resolutions bearing on this matter. On July 22nd, 1908, it was resolved:—

> That, as and from March 25th, 1908, Mr. Hoadley be paid a salary and commission calculated as follows:—When the total costs per unit sold, excluding capital charges, shall be 1·8d., the salary shall be £300 per annum, and for each £100 saved to the Committee through the reduction in cost per unit sold, a bonus of 20 per cent. per annum. In all cases the salary for the financial year ending in March shall be calculated on the costs of the preceding financial year.

But a resolution passed on November 10th, 1910, varied the basis of the bonus calculation and also contained a provision that "The total amount of remuneration and bonus not to exceed in any one year the sum of £500." The amount of salary and commission paid in 1913 was £300 and £200 (£500), and in 1914, £300 and two sums of £200 (£700).

MR. CHAS. L. TROUP, of Messrs. Troup, Curtis & Co., has joined the Sportmen's Battalion (Royal Fusiliers) for active service.

General.—MR. H. D. PEARSON is severing his connection with Messrs. Drake & Gorham, Ltd., and is taking up a position as manager of the electrical department of the Associated Manufacturing Co., of 72 80, Mansell Street, Aldgate.

Obituary.—It was with very deep regret that we observed in the *Times* of Monday last the following announcement:—"LIEUTENANT ALEXANDER NIGEL TROTTER, who was killed in action on October 12th, aged 20, was appointed to the 3rd Batt. Royal Scots (Lothian Regiment) in December, 1912. He was the only son of Mr. and Mrs. Alexander Pelham Trotter, of 181, Ashley Gardens, S.W., and Coates Farm, Fittleworth, Sussex." We are sure that every one of our readers will be anxious to join with us in expressing the deepest possible sympathy with so highly esteemed a member of the profession as Mr. A. P. Trotter, and Mrs. Trotter, in their terrible bereavement. Words fail us in these days when we want to express both our gratitude and our condolence as the Roll of Honour daily bears evidence of the sacrifices which are being so cheerfully made and so bravely borne. Mr. Trotter may be assured that the hearts of a host of friends in the electrical world are with him and his wife.

MR. ANGUS MACLEOD.—We regret to record the death, which occurred on 22nd inst. at Hornsey, at the age of 70 years, of Mr. Angus Macleod, who, we understand, was a pioneer of electricity supply in Scotland. About the year 1892 he started, in conjunction with Mr. Robert Hammond, the Scottish House-to-House Electricity Supply Co. Upon Mr. Hammond relinquishing contracting for consulting work Mr. Macleod carried through, in conjunction with the old County of London and Brush Provincial Electricity Supply Co., the construction and running of the electricity supply works for Coatbridge, which was the first electricity supply undertaking in Scotland to be carried out by a company under Parliamentary powers. Mr. Macleod had been an invalid for years, but he had always taken the keenest interest in electrical work and development.

NEW COMPANIES REGISTERED.

William Baily & Sons, Ltd. (138,088).—This company was registered on Oct. 23rd, with a capital of £6,000 in £1 shares, to take over the business of a manufacturing, wholesale, retail and furnishing ironmonger carried on by H. D. Baily at 54, Gracechurch Street, E.C., as William Baily & Sons, to carry on the same, and the business of electrical engineers, electricians, manufacturers of electrical apparatus, makers of cooking apparatus and stoves, etc., and to adopt an agreement with the said vendor (1) for the acquisition of the said business and for undertaking certain contracts and engagements, and (2) relating to management. The subscribers (with one share each) are:—H. D. Baily, 54, Gracechurch Street, E.C., ironmonger and engineer; Mrs. M. D. Baily, 32, West Park, Eltham, S.E. Private company. The number of directors is not to be less than two or more than five. The first are H. D. Baily (permanent managing director) and Mrs. M. D. Baily. H. D. Baily shall be entitled to draw upon the company's banking account for his salary up to £200 per quarter. Qualification (except first directors, who require none), £100. Registered office, 54, Gracechurch Street, E.C.

City of Freetown (Sierra Leone) Electricity Co., Ltd. (138,058).—This company was registered on Oct. 22nd, with a capital of £15,000 in £5 shares, to acquire a concession granted to A. I. S. Baron by the Corporation of the City of Freetown, to carry on the business of an electric supply company in all its branches. The subscribers (with one share each) are:—M. Railing, 67, Queen Victoria Street, E.C., electrical engineer; L. G. Byng, 67, Queen Victoria Street, E.C., electrical engineer. Private company. The number of directors is not to be less than three or more than seven; the first are H. Hirst, M. Railing, L. G. Byng and A. I. Suckling (managing director). Qualification (except local directors) 50 shares. Registered office, Midland Bank Chambers, 71a, Queen Victoria Street, E.C.

Wiring, Ltd. (138,027).—This company was registered on Oct. 22nd, with a capital of £2,500 in £1 shares, to carry on the basiness of electrical, mechanical and general engineers, electricians, manufacturers of electrical appliances, machine and engineering tool makers, boiler makers, founders, etc. The subscribers are:—Israel Davies, 12, Hyde Park Place, W., builder, 40 shares; B. Davies, 12, Hyde Park Place, W., electrical engineer, 40 shares; E. Davies, 12, Hyde Park Place, W., electrical engineer, 20 shares. Private company. The number of directors is not to be less than two or more than three; the first are Israel Davies and B. Davies (both permanent). Qualification, £20. Remuneration, £50 each per annum. Registered office, 90, Charing Cross Road, W.C.

Alpha Electrical Co., Ltd. (138,040).—This company was registered on Oct. 21st with a capital of £2,000 in £1 shares, to carry on the business of electricians, electrical, mechanical, sanitary, gas and water engineers, contractors, ironmongers, makers of electric tramcars, motor cars, carriages, cycles and other vehicles, manufacturers and suppliers of and dealers in dynamos, motors, telephones, bells, electroliers, etc. The subscribers (with one share each) are:—W. Schofield, 11, Boscombe Road, South Shore, Blackpool, yarn agent; G. S. Mills, 11, Hartley Road, Chorlton-cum-Hardy, Manchester, electrical engineer. Private company. The number of directors is not to be less than two or more than five; the subscribers are to appoint the first. Registered office, 263, Oxford Road, Chorlton-on-Medlock, Manchester.

Derby Day and Night Sign Co., Ltd. (138,042).—This company was registered on Oct. 21st, with a capital of £5,000 in £1 shares, to acquire certain options, to adopt an agreement with Helen Goulton as "grantor" and W. Goulton as "grantee," being an agreement to grant a licence to manufacture and sell under Patent No. 21,191 of 1913, to carry on the business of makers of illuminated and other signs, discs, reflectors, globes, lamps, etc. The subscribers (with one share each) are:—W. Goulton, 1a, Grove Park Road, South Tottenham, N., mining engineer; H. H. Speed-Andrews, 37, Abbotsford Avenue, South Tottenham, N., retired naval officer. Private company. The number of directors is not to be less than two or more than five; the first are W. Goulton and H. H. Speed-Andrews. Qualification, one share.

British Electrical Export Co., Ltd. (138,028).—This company was registered on Oct. 20th, with a capital of £3,000 in £1 shares, to carry on the business of manufacturers of and dealers in electrical fittings, fixtures, machinery, plant, utensils, lamps, stoves, etc. The subscribers (with one share each) are:—H. F. Simon, 27, Martins Lane, Cannon Street, E.C., electrical engineer; S. C. Russ, 27, Martins Lane, Cannon Street, E.C., electrical engineer; H. Sturton, 74, Great Tower Street, E.C., solicitor. Private company. The first directors are H. F. Simon, S. C. Russ and H. Sturton. Registered office, 27, Martins Lane, Cannon Street, E.C.

Metal Scrap, Ltd. (138,017).—This company was registered on Oct. 19th, with a capital of £12,000 in £1 shares, to take over from S. O. Cowper-Coles and work certain processes for (1) the detinning of tin scrap, (2) the recovery of zinc from galvanised iron, and (3) the removal of enamel from enamelled iron, to carry on the business of smelters, refiners, rollers and assayers, dealers in minerals, metals, and ores, electricians, electrical engineers, etc. The subscribers (with one share each) are:—C. W. Denny, 22, Edwardes Square, Kensington, W., engineer; H. Sawyer, 1 & 2, Old Pye Street, Westminster, plater. Private company. The number of directors is not to be less than two or more than 5; the first are S. O. Cowper-Coles and J. J. Gordon Gordon. Qualification, 100 shares. Registered office, 1 & 2, Old Pye Street, Westminster.

Ruthin Electric Supply Co., Ltd. (138,021).—This company was registered on Oct. 19th, with a capital of £5,000 in 400 cumulative preference shares of £5 each and 1,000 preferred ordinary and 2,000 ordinary shares of £1 each, to carry on the business of an electric lighting and power company in all its branches. The subscribers (with 50 shares each) are:—A. A. Douglas, Brendon, Colwyn Bay, manufacturer; J. H. Edwards, Haresfield, Stonehouse, Glos., engineer. Private company. J. H. Edwards is the first managing director. Qualification, 50 shares. Solicitors, Seymour Williams & Co., 38, Parliament Street, Westminster, S.W.

Barford Electric Supply Co., Ltd. (137,994).—This company was registered on Oct. 16th, with a capital of £5,000 in 4,000 preference shares of 10s. each and 3,000 ordinary shares of £1 each, to carry on at Barford and elsewhere in England the business of an electric light company in all its branches. The subscribers (with 50 shares each) are:—W. O. Rooper, 30, College Street, Dowgate Hill, E.C., civil engineer; V. Caldwell, Wray Cottage, Reigate, accountant and cashier. Private company. The number of directors is not to be less than three or more than seven; the first are D. Smith-Ryland, F. G. Bulley, V. Caldwell, R. Jones, and W. O. Rooper. Qualification, £50. Registered office, 30, College Street, Dowgate Hill, E.C.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Llangollen & District Electric Light & Power Co., Ltd. (75,384).—Capital, £6,000 in £1 shares (2,500 pref.). Return dated September 2nd, 1914. 2,114 shares taken up; £1 per share called up; £2,110 15s. paid; leaving £3 5s. in arrears. Mortgages and charges: £2,800.

Carmarthen Electric Supply Co., Ltd.—Particulars of £5,000 debentures, created 30th September, filed pursuant to Section 93 (3) of the Companies (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's property, present and future, including uncalled capital. No trustees.

Liverpool Electric Cable Co., Ltd. (71,099).—Capital £20,000 in £1 shares. Return dated July 21st, 1914; 10,000 shares taken up; £7,833 paid; £2,167 considered as paid. Mortgages and charges: Nil.

Newtons, Ltd. (48,936).—Capital, £40,000 in £10 shares. Return dated October 6th, 1914; 3,265 shares taken up; £18,650 paid; £14,000 considered as paid. Mortgages and charges: £14,000.

Bombay Electric Supply & Tramways Co., Ltd. (85,055).—Capital, £1,200,000 in £10 shares (60,000 pref.). Return dated July 7th, 1914; 60,000 ord. and 59,992 pref. shares taken up; £10 per share called up on 59,992 pref. and 33,000 ord. shares; £929,956 paid, including £36 paid on eight shares forfeited; £270,000 considered as paid on 27,000 ord. shares Mortgages and charges: £763,730.

CITY NOTES.

Uxbridge & District Electric Supply Co., Ltd.

The directors' report for the year ending 31st December, 1913, shows that the gross profit amounted to £4,603, less interest on debenture stock £3,750, leaving a balance of £835, plus £362 brought forward, making a total available of £1,215. Of this amount the dividend on preference shares absorbed £900, and £315 is to be carried forward. The business of the company continues to increase in a satisfactory manner as will be seen from the following figures:—

	Total output, B. T. Units.	Gross revenue. £
1910	654,853	6,895
1911	815,995	8,037
1912	1,266,209	10,389
1913	1,557,424	12,121

The supply of electricity to the Beaconsfield area and the extensions at Gerrard's Cross, to which allusion was made in the last report, have been completed; the outlay thus occasioned having been absolutely necessary in order that the company might maintain its rights under the Provisional Orders relating to those districts. The directors confidently anticipate that this expenditure will have a beneficial effect upon the future earnings of the company, as the returns arising therefrom should greatly exceed the cost of obtaining the necessary pecuniary assistance and the interest charges thereon. The capital expenditure of the company now amounts to £123,105, the total amount received under this heading having been only £116,275. In order to provide temporarily for this deficiency a sum of £10,000 has been raised by way of special loan. During the year the question of obtaining further capital to meet the above deficiency and to provide for further necessary extensions and plant has been receiving the very careful attention of the directors, but the outbreak of war has necessitated the postponement of any negotiations to that end, and therefore the whole question of the re-arrangement of the capital of the company must remain in abeyance for the present.

The fourteenth ordinary general meeting was held on Oct. 22nd at Hamilton House, Victoria Embankment. Mr. J. O. Callender, who presided, formally proposed the adoption of the above report. The motion was seconded by Mr. T. Petersen and carried.

River Plate Electricity Co., Ltd.

An extraordinary meeting of the shareholders was held on Monday at the offices, 62, New Broad Street, E.C., Mr. M. W. Mattison, K.C., in the chair.

The Chairman said that the object of the meeting was to consider a resolution for increasing the ordinary share capital of the company by £50,000, raising it from £150,000 to £200,000. The company did not propose at the present time to issue all the new ordinary capital—they proposed to issue £25,000 of it and, in addition, £25,000 of the 6 per cent. preference shares which were unissued. He quite agreed that the present was not a convenient time for the issue of fresh capital, but, on the other hand, it was not convenient or desirable that the company, which had an uncompleted programme of extensions and improvements, should be left without sufficient cash resources to meet its commitments. The board would not have been justified in taking such a risk, and therefore they had secured a guarantee of a full subscription of the proposed issue upon exceptionally easy terms. He did not think it could be said that the board had ever been guilty of any lavishness in the issue of new capital. The company had been in existence for 12 years, and during that time they had only issued £55,000 of fresh capital. In those twelve years their electrical system in the Argentine had grown out of all recognition. The money spent on extensions exceeded the new capital raised many times over; the difference had been found out of money put to reserve and depreciation, and from

other sources, and in that way, with a very small amount of new capital, they had built up a very large and valuable system. With regard to the proposed issue and the price, the preference shares carried 6 per cent. interest, non-cumulative. On the other hand, in the event of favourable liquidation they had to be paid off at 115. Some five years ago they issued £25,000 of those shares at par. The ordinary shares had for several years past received a 10 per cent. dividend, and two years ago, when they issued £30,000 of them, the price was 40s. for every £1 share. The board quite recognised that the present time was much less favourable than was the case two years ago, and therefore they proposed to issue the new ordinary shares to the ordinary shareholders in proportion to their existing holdings at 25s., combined with the issue of a corresponding amount of preference shares at par. They also intended to issue "letters of right" so that any holder who was so disposed could sell their rights. As to the disposal of the money, the principal work they had in hand was the completion of the underground area in the centre of La Plata. About two years ago they entered into a contract with the Government in which they undertook to place their works underground in the leading streets of La Plata. The Government on its part undertook to extend the public lighting contract for a further term of ten years, and the company also got other advantages. Nearly three-fourths of that work was completed, and the remainder ought to be finished in the course of the coming year, and it was only right that they should be in the possession of funds so as to be able to complete in due course. Then, again, they had made extensions in their operating plant at Ensenada, where about a year ago they put in some large turbine units. That plant had been erected and was nearly all paid for, but during the last year or so they had had considerable negotiations in connection with taking big power loads at Ensenada, one of which had been happily completed. The prospect of having to provide for those heavy loads had necessitated some increase in the boiler-house and the transforming plant, and the new capital would cover their expenditure in that connection. Within the last two or three weeks they had definitely concluded a contract for a period of ten years with Messrs. Armour, the big meat packers, to supply them with all the power required for large works which they were erecting at Ensenada, which would necessitate their putting down a certain amount of new machinery. As regarded the present position and prospects of the company, that was obviously a subject upon which he could say very little. During the first seven months of the current year and up to the outbreak of the war the business at La Plata continued to steadily progress, and if it had not been for the war he had no doubt that at the end of the year they would have been able to point to an increase in net profits in excess of any previous year. What the effect of the war might be upon their business he could not tell. Personally, he did not take a gloomy view of the situation, but it would be the height of rashness for anybody to attempt to predict how things would develop either at home or abroad during the next twelve months. It would be idle to suppose that their company any more than any other concern, whether here or in the Argentine, could hope wholly to go free from the evils growing out of the war. It was true that the Argentine was outside the actual area of the conflict; but, on the other hand, the trade and commerce of the world was now so connected that the first effects of financial disturbance and trade dislocation were felt nearly as badly in neutral countries as in those countries that were at the seat of war. On the other hand, the countries that would first recover were neutral countries, and especially a country like the Argentine which was associated with the production of the necessaries of life. The silver lining to the cloud at the present time was that all indications pointed to an excellent harvest there, and that, combined with the probability of high prices for all foodstuffs, gave hope of an early recovery in Argentina. As far as their own company was concerned, while it would unquestionably be an anxious time for the board and for the management abroad, and though it was possible they might have some temporary set-back, his personal belief in the continued success of the undertaking remained unchanged. In conclusion he proposed the following resolution:—

"That the directors be and they are hereby authorised to increase the capital of the company from £300,000 to £350,000 by the creation of 50,000 ordinary shares of £1 each, such shares to rank equally with the existing £150,000 ordinary stock of the company and to be issued at such time or times and on such terms and conditions and to such persons as the directors may prescribe and with power for the directors by a resolution of the board to convert such shares when fully paid up into ordinary stock of the company."

Mr. R. Miller seconded the resolution, which was carried unanimously.

Spanish & General Wireless Trust, Ltd.

The directors' report to the 30th June, 1914, states that the business of the Compania Nacional de Telegrafia sin Hilos, in which this company is a very large shareholder, although showing improvement, has produced no revenue to this company. The receipts from the stations, although increasing, are still unsatisfactory. The terms of the concession granted by the Spanish Government have been seriously impaired by later legislation, which it is believed entitles the company to substantial compensation. The managing director paid a visit to Madrid in the early part of the year and conferred with members of the Government with a view to arriving at a satisfactory settlement of the position which had been created. The negotiations are being continued by the directors of the Compania Nacional de Telegrafia sin Hilos and it is contemplated that a satisfactory solution may be reached at an early date. All the necessary arrangements have been made for the opening of the service between this country and Spain and the Canary Islands, but the inauguration of the service has been deferred owing to the outbreak of war.

Mr. Godfrey Isaacs (managing director) presided on October 23rd, at Marconi House, over the third ordinary general meeting of the company. In moving the adoption of the above report he said that the year had not been a very propitious one for any financial transactions such as would normally come within the province of that company's affairs, and therefore it had done little or nothing in that direction. The principal assets of the company, as they were aware, consisted of the shares held by them in the Compania Nacional de Telegrafia sin Hilos. That company's business had certainly made some progress. The receipts of the stations, as they anticipated last year, had shown quite an appreciable increase, but they had not increased to that extent which alone would enable the company to work upon profitable lines. The main business upon which that company would depend in an ordinary way would be that of the telegraphic business between Spain and other parts, mainly the Internal and Canary Islands. Unfortunately, since the Spanish Government granted the concession under which the Spanish Co. worked it had found it necessary to make certain changes in legislation which had materially impaired the value of the concession. In those circumstances the necessary representations had been put before the Spanish Government, and he went to Madrid and personally took part in that work, and he was satisfied that the Spanish Government appreciated the fact that it had very seriously impaired the property which the company held. He thought it would result in the Government deciding to purchase the stations held by the Compania Nacional at proper prices and pay them such other compensation in consequence of the harm which had been done to the concession, and this should place the Spanish and General Wireless Trust Co. in a fair intrinsic position. That was to say that the compensation and the price to be paid to the Compania Nacional, he hoped, would put it in the position of holding its capital intact, in which case, of course, the business it would in future conduct would require a very much smaller capital than that with which it was to-day registered, and consequently in all probability when the proper time came there would be some changes which would enable a very considerable return to be made of the capital originally invested. The service which it was intended to have opened between this country and Spain had been ready now for some time, all the necessary formalities having been dealt with between the General Post Office of Madrid and the British Postmaster-General, but in consequence of the war it had not been possible to start the service, the stations on this side being otherwise much more importantly occupied. That question, therefore, for the present had been deferred until the existing condition of things should change.

Mr. H. S. Saunders seconded the motion and the report was adopted.

Sao Paulo Tramway, Light and Power Co., Ltd.—The directors have declared a dividend of 2½ per cent.

Rio de Janiero Tramway, Light and Power Co., Ltd.—The directors announce a dividend of 1¼ per cent..

Lisbon Electric Tramways, Ltd.—The directors have declared an interim dividend of 3 per cent.

Babcock & Wilcox, Ltd.—Interim dividend 5 per cent., free of tax.

New St. Helens and District Tramways Co., Ltd.—The directors recommend a dividend of 2½ per cent. (2s 6d. per share) on the preference shares, £2,000 is to be put to reserve, and £3,387 carried forward.

Anderston Foundry Co, Ltd.—The directors announce an interim dividend of 4s. 6d. per share, less income-tax.

Callender's Cable and Construction Co., Ltd.—The directors have decided to pay, on November 2nd, the usual interim dividend on the ordinary shares at the rate of 10 per cent. per annum.

Western Telegraph Co., Ltd.—The directors, after transferring £160,000 to the general reserve fund, £30,000 to the land and buildings depreciation fund, and £130,000 to the provision on account of investment fluctuations, have decided to recommend a final dividend of 3s. per share, making, with the previous distributions, a total dividend of 6 per cent. for the year ended June 30th, 1914, and also the payment of a bonus of 2s. per share, both free of income-tax. The balance of the account is carried forward. The register of transfers will be closed from November 3rd to November 11th.

Montevideo Telephone Co., Ltd.

Mr. C. Lock (Chairman) presided on October 22nd, at Winchester House, E.C., over the annual meeting.

The Chairman, in moving the adoption of the report (see Elec. Rev., p. 535), said that with regard to the balance sheet the item of purchase price of property stood at £191,606, and after deducting £8,500 for depreciation out of last year's revenue they brought the purchase price down to £183,106. Telephone enterprises always required feeding, so to speak, and therefore every year witnessed additional outlay on capital account. This year the capital expenditure amounted to £6,603, bringing up the total of their purchase price as standing in the books to £189,709. The capital outlay was £4,400 less than in the previous year, when they incurred considerable expenditure in fitting up the new Aquada Exchange. That was not a recurring expenditure, and therefore they reaped the benefit this year. In the same way they had for two or three years past been making substantial capital expenditure in connection with the camp lines, and that expenditure was bearing fruit in that the lines were in good condition and needed little attention this year. Stores at Montevideo and in transit, £11,425, were about £3,200 up. Investments at cost were £4,700 up, due, of course, to the partial investment of some of the money retained as reserve fund and the carry forward last year. Their investments had always shown an appreciation at the end of the year, and they showed an appreciation on July 31st, but their present value was a matter for which no exact standard could be obtained. They must be satisfied with the fact that they were good substantial and good revenue bearing investments. Real estate in Montevideo showed an increase of £700, due to their having acquired the freehold of an exchange at one of the small country towns. Bills receivable were about the same, whilst the item of cash showed a substantial increase of £11,800 over last year. This was partly due to the fact that they had had refrained from investing some of the money coming from the other side, as they thought it better in such times to keep their assets in the most liquid form. At Montevideo they had a larger balance than usual, owing to instructions from the board, because the different sections of the switchboard sent out involved the payment of heavy duties. On the other side of the account, the capital remained the same. Sundry creditors showed a small increase, and the reserve fund was the same as last year. The reserve for renewal of plant was £35,500 against £27,000 last year. This year they were setting aside £9,500, which would bring the item up to exactly £45,000, which was a very substantial sum, but they might have to draw on it for the switchboard to which he had alluded. The profit and loss account showed the usual satisfactory moderate increase in receipts from subscribers—in round figures about £4,400 above those of last year. Interest on securities also showed a small improvement. On the other side working expenses were up about £1,800, and London expenses and income-tax were much about the same. The result was a profit of £28,524, as compared with £25,833 for the preceding year. They would infer from what he had said that the changes in the figures were due to the normal growth of the business and indicated a continuance of the yearly progress which they had experienced for a long time past. Last year he referred to several matters of interest. He told them that in one section they had put a portion of their plant underground, which they thought was a good thing, and had also obtained consent to putting another small section underground. This had now been completed. They had not found it necessary to apply for permission to lay any other isolated sections underground during the year, but they had always before them the question of a general underground concession. Although they had achieved no actual results in the way of getting an underground concession, yet the London Board and the Advisory Board had been in constant communication during the year, and under the advice of Sir J. Gavey the local board had been put into a position to open *pourparlers* with the Uruguay Government. No definite result had been received, but their position with the Government was better than it had been for some years past. They were not without hope that in course of time a reasonable and business-like arrangement might be come to with the Government which would enable them to put in a proper service and give satisfaction alike to the Uruguay Government, the Montevideo public, and the company. He need hardly say that the state of affairs caused by the war rendered it a matter of satisfaction rather than the reverse that they were not committed to heavy expense which an underground system would have involved. They could not put that down at less than £200,000 or £300,000 to start with, and such a heavy committment would at this time be a thing rather to be deplored. It was a satisfaction to the board at the present time to be able to say that they had no capital committments on any account, and their policy was to hold the investments they had and to place any further sums they received on deposit at their bankers, so as to keep their assets in the most liquid form. They hardly expected to be able to do so much next year because Uruguay, like other South American countries, had been affected by the long depression, and still more by the deplorable war which existed. For that reason they would be prepared for some diminution in their receipts. Under the circumstances, although they had an increased profit, the board felt that they should pay the same dividend as last year, viz., 5 per cent. on the preference shares and 6 per cent. on the ordinary. This was after substantial allocations for depreciation and an increased carry forward.

Mr. J. G. Le Marchant seconded the motion.

Mr. Herzheim asked what the total cost of the switchboard would be after paying the duties and other expenses to which the company would be put, and also whether the returns to date from Montevideo showed a serious falling off.

The Chairman said it was difficult to give the exact cost of the switchboard. It would come to five figures on this side and there was a duty of 40 per cent. payable on the plant at Montevideo, so that they might have to pay anything from £14,000 to £17,000 before the switchboard was erected in their exchange. He had only the return for August for Montevideo, which showed that the falling off in the number of subscribers was in the neighbourhood of 50. He did not know that it would affect the revenue greatly as they had got their system in a good state of repair and might be able to reap the benefit of this in the current year.

Sir John Gavey explained that the company was compelled to introduce a magneto switchboard as it would have been impossible to work a common battery board except with a perfect underground system. But they had taken advantage of all modern developments so as to import into the magneto board as many of the elements of perfection as were possible in a common battery board. He thought theirs was the most up-to-date magneto board which had ever been manufactured. Another point was that they would always have to use magneto boards in the camp lines. The number of subscribers and the size of the exchange were too small to justify common battery working, and this particular board had been so constructed that when the time came for them to place wires underground and introduce a new system, whether common battery or automatic, this board could be cut up and used for any of the camp line exchanges. In fact they rather hoped to renew the camp line system with this board cut up in 200 line sections.

The report was then adopted.

Barbados Electric Supply Corporation, Ltd.

Mr. A. W. Tait (chairman) presided on October 21st, at Basildon House, Moorgate Street, E.C., over the annual meeting.

In moving the adoption of the report (Elec. Rev., p. 535), the Chairman said the profit on operation for the year ending June 30th amounted to £1,381, which compared with a profit of £395 during the previous year, an increase of £986, or, approximately, 250 per cent. This improvement resulted after charging £483 for repairs and maintenance, or £319 more than in the previous year. Charges for maintenance were naturally of an increasing nature in a new undertaking, but the apparently large increase in the year under review was explained by the fact that it was principally for replacement of poles. It had, unfortunately, been necessary to replace a large number of the poles originally sent out, which were of Norwegian pine, by poles of harder wood, as they were found unsuitable for the local conditions, quickly rotting and becoming dangerous. The poles being substituted were Wallaba poles from Demerara, and they were particularly suited to local conditions. He was afraid that this heavy charge for replacement of poles would continue until the whole of the poles had been renewed. The general results had been satisfactory. The progress made had been steady and should be lasting. The number of lamps and motors connected, of an equivalent of 25 c.p., was 12,715 on June 30th, which was an increase of 3,285 during the year, or nearly 35 per cent. The number of consumers had now reached 737, the work of wiring and installing the new services, 281 in number, having been in most cases carried out by their own wiring department. The profit on this department was satisfactory. The profit would, however, tend to decrease as there were now two other wiring contractors in Barbados. This change had facilitated the work of connecting consumers, as it had been difficult for the company to train and maintain a sufficiently large wiring and fitting staff to meet requirements. With regard to public lighting, this had grown during the year from 7,200 c.p. to 13,800 c.p. There were difficulties in the way of extending this supply, the principal being that a larger outlay was required than was justified by the length of the contracts, which were usually for a period of twelve months only. Last year he spoke as to the high cost of generation and explained that this was largely attributable to the low load factor. Everything possible had been done to encourage a day load, but the scope for power supply was small and their progress had not been appreciable. Reference was also made in this connection to negotiations with the Tramways Co. for the supply of power for electric traction. These negotiations had reached a certain point, and further proposals by the company were now being considered by the Tramways Co., but nothing definite had evolved so far. They were still hoping that they would be able to come to some arrangement which would be of advantage to both concerns, but, as the shareholders would appreciate, financial conditions were not favourable for the raising of capital. The question of oil fuel had again been one of the contributory causes of high generating costs, but this question had received very careful consideration and samples of various kinds of oil had been tested and tried during the year. They might be roughly summarised as follows:—Barbados oil, of which the supply had ceased for the present, 9,000 gallons; Trinidad oil, 1,650 gallons; American oil, 26,071 gallons; total, 37,621 gallons. Steps had been taken to ensure that their supplies did not

run short owing to the war, and at the present time there should be sufficient oil in store, which they were able to secure largely from Trinidad, for over a year. No progress appeared to have been made by the Mexican Eagle Oil Co. to establish an oil depôt in the island, which was a proposal he mentioned at the last annual meeting. Their general manager reported that with the exception of the trouble with poles, the plant and mains had been kept in satisfactory working order. A re-arrangement of the transformers, better in accordance with the needs of the various districts, had resulted in a reduction of the transmission losses. With regard to the profit and loss account the expenses had been £1,823, or an increase of £139. The capital expenditure during the year was £1,830, and this represented, with the exception of £35, extensions to the mains for public and private services and house connections with consumers. The other items in the balance sheet did not call for comment. In view of the present state of the war and the consequent disturbance in industrial and financial arrangements, it was difficult to speak of prospects for the current year. Naturally the applications for new connections had fallen off, but it was impossible to forecast to what extent the supply of current might be affected. There should, however, be an increased revenue from the increased number of consumers now connected, and, personally, he would be disappointed if they were not able to show continued improvement. The business now seemed to have turned the corner, and if they followed the usual experience of electric supply companies the results should be gradually progressive, although, of course, they had a long way to go before there could be any prospect of a return upon the share capital invested. The general manager reported that the staff had worked well.

Mr. W. F. Leese seconded the motion, and the report was adopted without discussion.

Auckland Electric Tramways Co., Ltd.

The annual meeting was held on October 22nd at the Electrical Federation Offices, Kingsway, Mr. C. G. Tegetmeier presiding.

In proposing the adoption of the report (Electrical Review, p. 534) the Chairman said that the company had contributed £1,000 to the patriotic fund which was being raised in New Zealand in connection with the war, and he felt sure the shareholders would heartily endorse that action of the directors. The outstanding feature of the company's operations during the past twelve months was the strike in New Zealand which, commencing in a small way in October of last year was quickly turned by mischievous agitators into the most serious industrial upheaval that the Colony had ever witnessed. There was no question of hours of labour or rates of pay involved—the real question was whether a socialistic and revolutionary organisation called the Federation of Labour should be allowed to control the whole of the labour conditions in the Dominion and set at defiance the Conciliation and Arbitration Act, which provided the necessary machinery for the equitable adjustment of industrial disputes. The employers refused to submit to the dictation of this organisation or to recognise it as the controlling authority in labour questions, and a general strike was called. The call was not uniformly responded to by the labour unions, but after a time every industry throughout New Zealand was affected. The community took measures for self-preservation; gradually the forces of order prevailed and it was not long before the strikers were going back to work—many to find their places filled. With the collapse of the general strike and the complete defeat of the Federation of Labour, he thought they might look forward to a period of industrial peace in New Zealand for some time to come. The effect of the strike upon their business was very considerable—not only was there a diminution in receipts but there was a large increase in expenses. The tramway service was stopped entirely for 18 days—from 8th to 25th November—owing to their not being able to get any coal, so that the question of their men joining the strike did not arise. The loss of traffic receipts owing to the stoppage was estimated at approximately £15,000. The receipts were also adversely affected in the year by the prevalence of an epidemic of smallpox among the Maori population which caused a scare among the Europeans. The traffic created by the Auckland Exhibition helped their receipts, but not to the extent they had anticipated, and the same might be said with regard to the six motor 'buses which they specially acquired for the purpose. Having in view the many adverse circumstances that had affected the business during the year it was gratifying to know that they had maintained that progressive expansion in their traffic receipts which they had experienced in every successive year of the company's operations since they started electrical running in 1902. The total traffic receipts amounted to £271,701, which was £14,110 more than in the preceding year, and the number of passengers carried increased from 40,300,000 to 42,100,000, which represented an average of more than the whole population of Auckland every day throughout the year. In view of the monetary position brought about by the war it was matter for satisfaction that they were able to regard their financial position without uneasiness. They had adequate liquid resources and an unissued balance of £150,000 in debenture stock. On renewals they had spent a total of £31,494, which had been charged to the renewals and maintenance account. That, added to the £34,834 spent in the preceding year made a total of £66,338 expended in two years. A good deal of re-construction work on the earlier constructed lines had now been carried out, and, although the renewals expenditure would necessarily be continuous, they looked forward to a material decrease in the annual outlay during the next few years. The total expenses showed a large increase, and for the first time in the history of the company the increase was greater than the increase in the receipts. The principal item was power and running expenses £118,130, or £18,320 more than in the preceding year. That was due to several causes. In the first place they ran a greater number of car miles during the year, and the cost of running was largely increased for some time after the strike by the higher price they had to pay for coal. Then, again, although their receipts entirely ceased during the time the cars were not running, a good deal of their expenses continued all the same. The net profit of £51,719, after placing £22,500 to renewals and depreciation account, was £2,458 less than in the preceding year. Considering the many adverse circumstances which had affected their operations during the year, and the fact that the £125,000 of new capital on which they had had to pay a full year's interest and dividend had been only partially productive, it was very satisfactory to find that they were able to maintain the same rate of dividend—1s. 7d. per ordinary share for the year and to place £32,500 to the credit of reserve accounts. As to the future, he did not anticipate that the war would prejudice the position in Auckland or New Zealand to any serious extent. Their cabled returns up to September 25th, which comprised nearly two months of war time, showed that their traffic receipts from July 1st to that date amounted to over £4,000 in excess of the corresponding period last year, which represented a very material increase in the net profit.

Mr. C. Shirreff Hilton seconded the motion, and the report was adopted.

Official Notices re Companies.—The following companies will, unless cause is show to the contrary, be struck off the Register at the expiration of three months :—

Automatic Lock Nut Co.
Bean Co. (British Electrical and Mechanical Co).
British Medical Electric Appliances Co.
Dioptric Sign Co.
Electrical Power Users' Assoc'ation.
Electric Fire Prevention Appliances and General Manufacturing Co.
International Syndicate for Electric, Water-Power and Public Works Concessions.
Institution of Signal Engineers (Inc.).
London Electric Treatment Institute.
Machinery, Ltd.
Never-Skid Band Manufacturing Co.
North Lancashire Tramways, Power and Construction Syndicate.
Power Engineers.
Salamander Fire Bar and Smoke Preventer Co.
Star Electric Light Co.

Calcutta Electric Supply Corporation, Ltd.—The directors have declared an interim dividend on the ordinary shares for the half-year ended June 30th last at the rate of 7 per cent. per annum, payable November 15th.

STOCKS AND SHARES.

Tuesday Evening.

The news of the week has contributed to a feeling of quiet confidence in Stock Exchange markets, and has assisted in the liberation of fresh money for investment; so that securities of the gilt-edged order have come to the front—using the phrase in its Stock Exchange sense—at improving prices. There is naturally plenty of stock on offer, and probably a great deal more to come out before the floating supply gets into the hands of permanent holders. At the same time, the steady absorption of small amounts is a factor of encouragement and hopefulness. So far as the electric section is concerned, the enquiry runs mainly upon good-class preference shares and the debenture stocks.

Doubt exists whether the Stock Exchange will be able to carry through its intention of having a settlement on Nov. 18th, as already arranged. There is sharp conflict of opinion as to the desirability of opening the House at the present juncture, and it is contended that, if the Stock Exchange remains closed, the arrangement of a settlement will present unlooked-for difficulties. A factor of much uncertainty is what may be the result of the raising of the moratorium on Nov. 4th. Trade circles are not likely to be affected to any appreciable extent, and most people concede that the moratorium has now served its purpose and can be cast off without giving rise to financial difficulties.

This view is controverted in some of the banking circles, which profess apprehension at the prospect of what is likely to happen after Nov. 4th. It is obvious that any serious disturbance to the banking world must be reflected in commercial spheres, but the misgivings that have been voiced seem to some of us to be needlessly timid and fearful. However, the event will not be long now in declaring itself; and the Stock Exchange, at all events, waits with composure for it to materialise.

The electricity supply market remains dominated a good

deal by the absence of buyers rather than any particular pressure to sell. While the authorities regard it as necessary to enshroud London in semi-darkness at night, it is scarcely likely that the investor will turn to thoughts of illumination shares as remunerative channels for his money. The increase in the number of serious accidents points to the necessity for relaxing the stringency of the present regulations as far as it can be done with reasonable safety; meanwhile, the companies have to content themselves with curtailment of their profits as one of the contributions they are obliged to make towards the price paid for European war.

The London County Council, as already noticed here, has postponed until Nov. 10th deliberation of its scheme for unifying London's electric supply, and there is a good deal of speculation as to what is likely to happen when the proposal is again put forward. The first point that strikes a layman is that the County Council must include in its Parliamentary Bill powers for the raising of new capital, and to any proposal of this sort the Government might quote its urgent necessities at the present time as a reason for refusing to pass the Bill.

This, of course, is simply supposition, based on the fact that the war-needs of the country call for such substantial amounts of money that they may be advanced as a reason for Parliamentary refused to sanction any municipal or other scheme that would involve appeal to the public for large sums just now. Alternatively, of course, it might happen that the Government would consent to the Bill, provided the issue of fresh capital were to be delayed, or spread over such a term as would render the instalments to appear comparatively small. In the ordinary way, moreover, other difficulties could have been foreseen in the way of a measure of such comprehensiveness that it embraces local authorities so far outside the area of the L.C.C. as, for example, Woking and Tilbury.

Again, the layman brings his foresight to bear on the probability that during the present weeks the County Council is no doubt doing all in its power to ensure as smooth a passage as may be for its Bill, and, to this end, working now to bring into line those conflicting interests which in the past have proved such stumbling blocks to schemes of like nature. These are generalisations apparent to anyone who cares to explore the ground as it stands revealed at present. There is as yet nothing sufficiently definite to warrant more than practical surmises as to the probabilities concerning the whole important plan.

The telegraph market is very steady. In this section we hear of more demand recently than has been the case for a couple of months; and the prospective buyer is engaged in obtaining particulars of dividend yields, reserve funds and so forth, in connection with the cable companies. Eastern Telegraph stock, Eastern Extension shares and Western Telegraphs are all wanted by cheap buyers; the returns on these at the present prices are 5⅝ per cent., 6⅛ per cent., and 5⅝ per cent. respectively. Those who are in a position to know how the companies are doing, declare that traffics are excellent and that the loss occasioned by curtailment of commercial cables has been more than compensated by the necessity for sending cables in plain language, and the enormous demand which there is for war news. The former has just been modified, but its effect upon the traffic returns for the past three months should be found very satisfactory.

Globe Telegraph and Trust Preference have still to be classed in the "wanted" list, and various others of their kind are being quietly bought. New York Telephone bonds, which were the other day offered at 95¼, have risen to 97½, with little stock about. The bonds carry a coupon payable on Nov. 1st, and the security is so liberal that investors are content to buy them at a figure which compares favourably with many of those quoted for most other foreign industrials. In Marconis there is not much business going on. The slight flutter of excitement which dropped the price to 30s., after its having been 35s., has died away, and the price keeps round about 32s. 6d., with Canadas at 4s. 6d. and Americans at 9s.

As the situation in Mexico appears to worsen instead of improve, prices of the various Mexican issues are naturally dull. There are still buyers, however, of Mexican Electric Light and Power First Mortgage bonds at 73. Mexican Electric Light First Bonds can be sold at 55. Monterey Debenture is quoted about 50. Mexico Tramways changed hands the other day at 52, but in the Light and Power Common shares we have not been able to trace a transaction for several weeks past. Brazil Tractions held their rise at 50 until dullness supervened in other markets, ostensibly on the advance of the Germans on Calais, when the quotations eased off to 49. British Columbia Electric Railway Deferred is 103, the Preferred 91½; while the Company's Vancouver 4½ per cent. Debenture can be negotiated on the basis of 83. Rio Tramway Firsts changed hands at 80 in a very small amount, and there are now one or two buyers at 81. Anglo-Argentine Tramways 5 per cent. Debenture stock is being dealt in on the basis of 87-90.

British Electric Traction 5 per cent. Debenture changed hands the other day at 88. Amongst other debenture stocks that are wanted are London Electric at 88½ and Westminster Electric 3½ per cent. stock at 83¼. The latter price looks unduly high until it is remembered that the company must redeem this issue in 1920 at 100, and it is understood that the company has the money in hand already—invested in first-class securities. At 85, the yield is £6 15s. per cent., taking redemption at par into account.

The manufacturing list is still attracting some little attention. Edison & Swan £3 paid shares are favourites at 6s., and the fully-paid stand at 1⅛; buyers have given more during the past few days. Crompton Ordinary at 5s., and the Preference at 10s., are somewhat neglected. General Electrics keep at 11½ for the Ordinary, 9¾ for the Preference. There is a demand for British Westinghouse Prior Liens at 99, although the 4 per cent. Debenture Stock can be picked up about 73; the Preference shares are 28s. 9d.

In the Rubber market business is idle, with fluctuations from Monday to Saturday scarcely worth mentioning. The novel and important part which rubber is playing in the present war is merely having the effect of keeping prices steady. Some of the Antwerp refugees have found refuge and employment in Mincing Lane and its environs. Armament shares show no special movement, and here, again, buyers seem to think that prices are now sufficiently well valued. Amongst copper shares the tendency is distinctly heavy.

MARKET QUOTATIONS.

Owing to the war, the prices given below are, of course, more or less nominal.

Wednesday, October 28th.

CHEMICALS, &c.		Latest Price.	Fortnight's Inc. or Dec.
a Acid, Hydrochloric	per cwt.	Nom.	..
a „ Nitric	„	„	..
a „ Oxalic	per lb.	8d.	..
a „ Sulphuric	per cwt.	Nom.	..
a Ammoniac Sal	„	„	..
a Ammonia, Muriate (large crystal)	per ton	£49	..
a Bleaching powder	„	Nom.	..
a Bisulphide of Carbon	„	„	..
a Borax	„	£18 10	..
a Copper Sulphate	„	£22	..
a Lead, Nitrate	„	£32	..
a „ White Sugar	„	Nom.	..
a „ Peroxide	„	„	..
c Methylated Spirit	per gal.	„	..
a Potassium, Bichromate, in casks	per lb.	7d.	..
a Potash, Caustic (88/90 %)	per ton	Nom.	..
a „ Chlorate	per lb.	7½d.	..
a „ Perchlorate	„	5½d.	..
a Potassium, Cyanide (98/100 %) (for mining purposes only)	„	Nom.	..
a Shellac	per cwt.	55/-	..
a Sulphate of Magnesia	per ton	Nom.	..
a Sulphur, Sublimed Flowers	„	£8 10	..
a „ Recovered	„	Nom.	..
a „ Lump	„	£7 10	..
a Soda, Caustic (white 70/72 %)	„	Nom.	..
a „ Chlorate	per lb.	„	..
a „ Crystals	per ton	„	..
a Sodium Bichromate, casks	per lb.	8¼d.	..
METALS, &c.			
b Aluminium Ingots, in ton lots	per ton	£88	..
b „ Wire, in ton lots (1 to 14 S.W.G.)	„	£112	..
b „ Sheet, in ton lots	„	£119	..
p Babbitt's metal ingots	„	£50 to £221	..
c Brass (rolled metal 2" to 12" basis)	per lb.	7¾d.	..
c „ Tube (brazed)	„	9¾d.	..
c „ „ (solid drawn)	„	8¼d.	¼d. dec.
c „ Wire, basis	„	7⅞d.	..
c Copper Tubes (brazed)	„	9¼d.	¼d. dec.
c „ „ (solid drawn)	„	9½d.	¼d. dec.
g „ Bars (best selected)	per ton	£72	..
g „ Sheet	„	£72	..
g „ Rod	„	£72	..
d „ (Electrolytic) Bars	„	£56	..
d „ „ Sheets	„	£74	..
d „ „ Rods	„	£62	..
d „ „ H.C. Wire	per lb.	7¾d.	..
f Ebonite Rod	„	8/-	6d. dec.
f „ Sheet	„	2/6	6d. dec.
n German Silver Wire	„	1/7	..
h Gutta-percha, fine	„	6/10	..
h India-rubber, Para fine	„	2/7½	2d. dec.
l Iron Pig (Cleveland warrants)	per ton	48/3	..
l „ Wire, galv. No. 8, P.O. qual.	„	£16	..
g Lead, English Pig	„	£18 10	..
m Manganin Wire No. 28	per lb.	6/6	..
g Mercury	per bot.	£10 to £10 5s.	..
e Mica (in original cases) small	per lb.	4d. to 2/6	..
e „ „ „ medium	„	8/- to 5/-	..
e „ „ „ large	„	6/6 to 10/6 & up.	..
o Nickel, sheet, wire, &c.	„	Nom.	..
p Phosphor Bronze, plain castings	„	1/1 to 1/8½	..
p „ „ rolled bars & rods	„	1/0½ to 1/2	..
p „ „ rolled strip & sheet	„	1/2½ to 1/5½	..
o Platinum	per oz.	185/-	..
d Silicium Bronze Wire	per lb.	10½d.	..
r Steel, Magnet, in bars	per ton	£141	..
g Tin, Block (English)	„	£133 to £135	..
n „ Wire, Nos. 1 to 16	per lb.	2/1	1d. dec.
p White Anti-friction Metals	per ton	£44 to £194	..
k Zinc, Sh't (Vieille Montagne bnd.)	„	Nom.	..

Quotations supplied by—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakspeare.
h Edward Till & Co.
l Bolling & Lowe.
k Morris Ashby, Ltd.
l Richard Johnson & Nephew, Ltd.
m W. T. Glover & Co., Ltd.
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p
r W. F. Dennis & Co.

LARGE INDUCTION MOTORS: SOME FEATURES OF MECHANICAL DESIGN.

By G. MOORES, B.Sc. Eng.

(*Concluded from page* 573.)

Diamond Windings.—This is probably the most familiar type of winding on electrical machines, being used for both stators and rotors as well as for D.C. armatures. When it is used on an induction motor stator (with half-closed slots) it is formed by pushing straight bars through the slots and

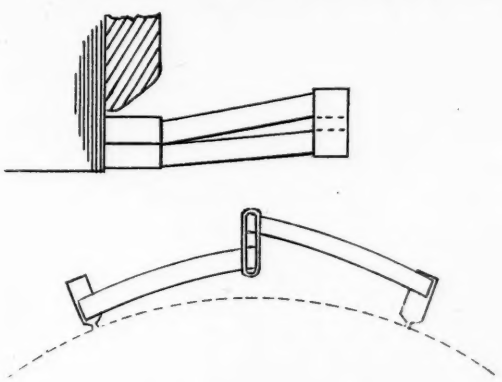


Fig. 36.

then bending the ends of the bars over to form diamond end connections. The bars are then connected together at the ends as shown in fig. 36, which represents an end view and section of the winding.

The design of the shape of diamond windings is a simple matter, and is shown in several text-books. The only thing to be calculated is the slope of the end-connection relative to the slot portion of the bar, the angle between these two being $\sin^{-1} T/P + 90°$, where T is the thickness of the insulated coil together with any clearance or packing which may be deemed necessary, and P is the pitch between adjacent coils at that point where they are nearest the centre of the machine.

In the case of open slot machines, diamond coils are often wire or strap wound, and are made in three different ways:—(1) Round wire coils, usually made to finished

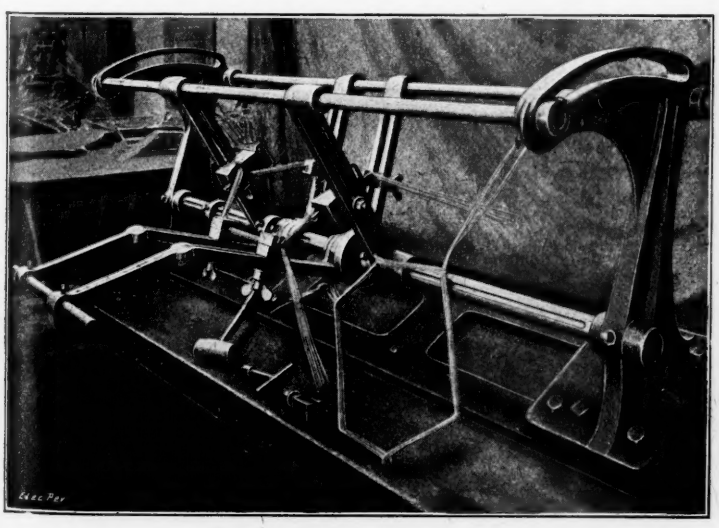


Fig. 37.—Machine for Pulling Coils.

shape on a mould of wood or fibre; (2) Rectangular wire, or ribbon coils, usually wound first in a loop, thus ⊂⊃, and then pulled in a separate machine to the finished shape; (3) Strap coils, usually wound to finished shape on an iron former. Round wire coils may of course also be pulled in a separate machine, and even light strap coils as well. Fig. 37 illustrates a type of pulling machine used for this purpose, showing a coil in the machine and one which has been pulled lying in front of it.

Involute or "Butterfly" Windings.—Bar windings of this type on stators are formed by pushing straight bars through the slots, and then connecting them by separate end connectors of copper strap bent into the shape of two involutes, these lying in two different planes at right angles to the axis of the machine. An end view and section of this type of winding are shown in fig. 38. The design of the shape of involute end connectors will be dealt with

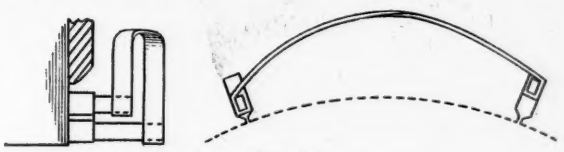


Fig. 38.

under rotor windings, as they are similar to involute coils, and these are more commonly met with on rotors.

Concentric Bar Windings.—This type is generally found on large high-speed machines with two or four poles, where the length of the end connections is too great to permit of the use of diamond or involute windings. Fig. 39 is an excellent example of this type. It represents a two-pole, bar-wound, concentric-winding in three tiers, and shows the extremely neat construction possible and the small space occupied by end-connectors of this type. The stator here illustrated is for a 550-H.P., 2,400 R.P.M. induction motor by Messrs. Vickers, Ltd., Sheffield. This type of winding is also largely used for turbo-alternators.

Concentric Wire Windings—For the largest machines, particularly those of high voltage, concentric wire windings are the most common. They are shown in the table classified as "hand-wound" and "push-through." Hand windings, though formerly very common, are not of much importance now commercially. They can be made up into a very neat winding, but they have three great disadvantages—the expense of winding them, the difficulty of insulating them, and the expense, time, and skilled labour required for repairing them. They are now, therefore, seldom met with.

By far the most important of all stator windings at the present day is the "push through" concentric wire winding. Coils for this type of winding are wound on a wooden mould to the shape shown in fig. 40. The slot portions of the coil are then thoroughly insulated, and when dry the coil is pushed through (hence the name) the slots from one end of the machine, and at the other end the wires are bent over and connected to one another by special connectors or by welding.

The moulds used for winding these coils vary considerably. Some moulds are rotated and the wire wound on to them directly off a reel. The coils may be either wound to the finished shape or wound flat on the mould and afterwards bent. By another method, the wires are cut off to the correct length and then laid in a mould and pressed into shape under a screw press. The most suitable method for any particular case depends to a great extent on the size of the coil and the number and size of wires composing it.

Mush Windings.—For moderate and smaller size machines, and for low voltages, mush windings are very convenient and economical. Success with these windings, however, depends to a great extent upon the correctness of the design of the coil shapes. The ends of the coils have to be shaped finally by hand in the machine, and unless the original shape is well designed, a great deal of hammering is necessary

to get the coils into position, with the result of damaged insulation and very ugly appearance of the machine when wound. This type of winding would probably be much

Fig. 39.—Stator of Vickers 550-h.p. Motor.

more widely used were it not for the difficulty of obtaining correct original shapes for the coil ends. The coil end when the machine is wound should be an evenly curved spiral, in shape something between a diamond and an

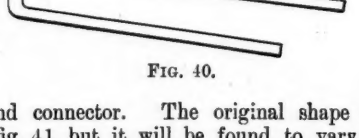


Fig. 40.

involute end connector. The original shape should be similar to fig. 41, but it will be found to vary somewhat for different makes of machines, as it depends slightly on the relations of slot width to slot depth, and number and depth

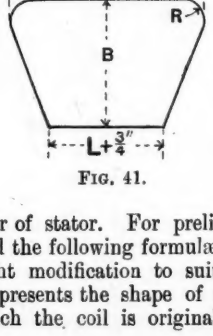


Fig. 41.

of slots to diameter of stator. For preliminary designs the writer has deduced the following formulæ, which may, however, require slight modification to suit particular conditions. Fig. 41 represents the shape of the centre block of the mould on which the coil is originally wound, and the

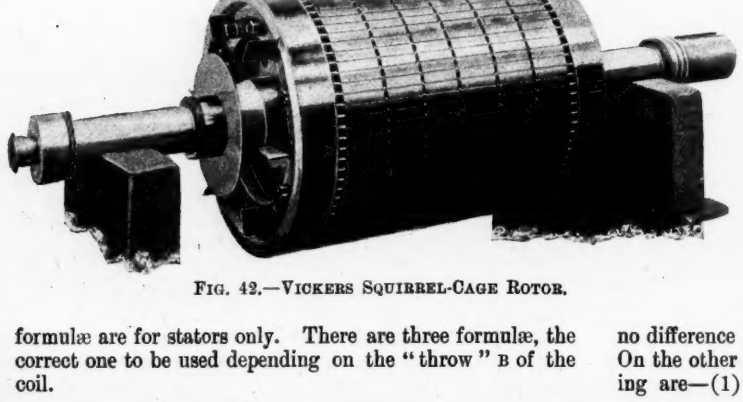


Fig. 42.—Vickers Squirrel-Cage Rotor.

formulæ are for stators only. There are three formulæ, the correct one to be used depending on the "throw" B of the coil.

1. For values of B from $2\frac{3}{4}$ in. to $4\frac{3}{4}$ in.,
   $B = DC + \frac{5}{16}$ in.
   $A = L + 1{\cdot}14\,B - \frac{5}{8}$ in.
   $R = 1$ in.
2. For values of B from $4\frac{3}{4}$ in. to $5\frac{1}{4}$ in.,
   $B = DC + \frac{3}{4}$ in.
   $A = L + 1{\cdot}115\,B - 1\frac{1}{4}$ in.
   $R = 1\frac{1}{2}$ in.
3. For values of B over $5\frac{1}{4}$ in.,
   $B = DC + 1$ in.
   $A = L + 1{\cdot}18\,B - 2$ in.
   $R = 1\frac{3}{4}$ in.

where T is throw of coil (1 and T + 1),
S = number of slots,
D = internal diameter of stator,
L = length of core,
and $C = 2{\cdot}12\,T/S + {\cdot}12$.

Mechanical Support.—There exists some difference of opinion as to the necessity for securing the windings of

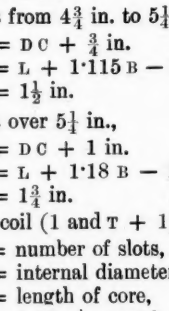


Fig. 43.

induction motors by means of clamps to the stator frame. In the case of generators this necessity is undoubted as the end connections are subject to enormous stresses if a short

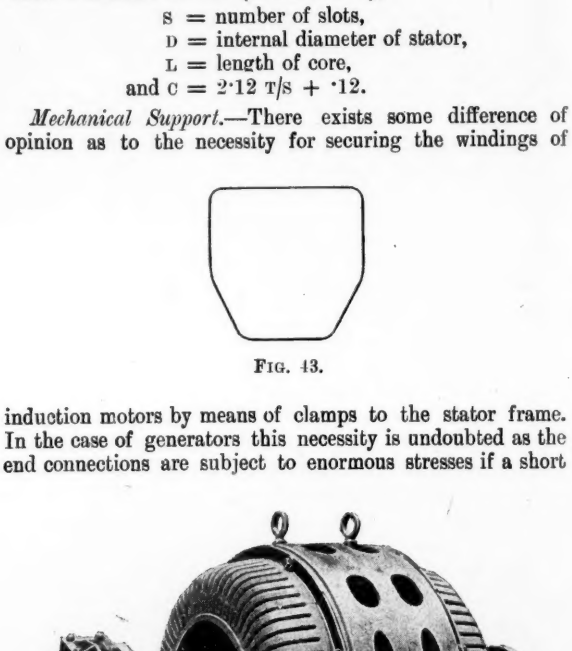


Fig. 44.—British Thomson-Houston Colliery Motor.

circuit occurs, but in the case of motors there is not the same necessity, as, although the winding may be subject to sudden rushes of current due to sudden changes of load and momentary heavy overloads, these excess currents are not to be compared with those obtaining when a "short" occurs in a generator circuit. It is, therefore, probable that the natural rigidity of the end connections of a motor winding gives sufficient mechanical strength without rendering it necessary to clamp the windings to the frame. There is, of course, the matter of vibration to be considered; if this is likely to be exceptionally severe in any particular case, clamping may be considered advisable.

Concentric v. Diamond Windings.—In the case of open slot machines, the choice is open between these two types of winding, so that a list of their comparative advantages may be useful. The diamond winding has advantages in that—(1) One former can be used for all coils, hence this is the cheaper winding; and (2) There is no difference in the self-induction of the individual coils. On the other hand, points in favour of the concentric winding are—(1) Simplicity in shape, and therefore ease of

effecting insulation; (2) Comparatively short end-connections, especially for high-speed machines; (3) Low voltage between conductors in same slot; (4) By suitable arrangement stator can be split without disturbing coils; (5) Convenient shape for clamping to frame.

Rotor Windings.

Squirrel-Cage Rotors.—The features of interest at present in connection with rotor windings are to be found chiefly in connection with squirrel-cage rotors. The windings of these consist of copper bars lying in the slots, all the bars being connected at each end of the rotor to a resistance ring. This, of course, forms a very compact and reliable construction, and considering its simplicity it is rather remarkable how many different methods have been evolved for obtaining a mechanically and electrically sound construction. And such a high degree of efficiency has been attained in many cases that it is very difficult to choose between one and another.

A good example of a modern squirrel-cage rotor is illustrated in fig. 42. This is by Messrs. Vickers, Ltd., and is from the stator previously illustrated. The end rings of this rotor are made of Vickers "high tensile manganese bronze," and are shrunk on to forged steel end supports with pure mica insulation. It is fitted with fan blades for ventilating the stator end connections.

Messrs. Bruce Peebles employ a construction in which the bars are connected together by rings of special alloy which, by means of a patented process, are cast solid on to the ends of the copper bars, thus ensuring perfect electrical contact as well as sound construction mechanically.

A third method of construction is that patented by Messrs. The Lancashire Dynamo Co. The end rings of the winding consist of sheet copper punchings like armature punchings, with the same number of teeth as there are rotor slots, the teeth being bent round at right angles to the plane of the end rings and the bars being slotted to receive them.

In still another type, the conductors in each slot consist of two or three copper straps side by side; at the outside of the slot these straps are twisted together through a right angle; they then lie on top of one another on the end ring, to which they are secured by screwing and soldering.

Wound Rotors.—Of rotors with slip rings those provided with diamond bar windings are by far the most common, partly because of the convenience of winding, but chiefly because they lend themselves to a convenient method of banding. The voltage of an induction rotor being independent of that of the stator, a moderately low voltage can always be used, so that the rotor may be bar-wound. In this form of winding the bars are cut off into straight lengths and insulated, and then pushed through the slots and the ends bent over to form a diamond-shaped winding. Such machines have generally a "six-circuit" wave winding, but the largest machines are sometimes lap wound and provided with equalising rings. A good example of this type of winding is afforded by the British Thomson-Houston rotor previously illustrated.

Rotors have also been wound with hand-wound concentric coils of pressed cable, but this practice is not very common now, as the winding was found to be expensive, and there was, besides, the difficulty of satisfactorily supporting the coils mechanically.

Coils of double involute form are occasionally used, though they are much rarer than they used to be, even on D.C. machines. The principle of the design of such windings is the same whether for rotor coils or for stator end-connections of the type previously mentioned. The shape of the involute should be correct geometrically, the radius of the base circle of the involute being $N/2$, where N is the total number of coil sides or connectors in one plane, and "t" is the total insulated thickness of one such coil or connector. Unless the shape of the involute is fairly accurate there is always difficulty in winding such coils, especially on a rotor. These double involute, or "butterfly" coils, are usually made by first winding on a flat mould, and then pulling out to the correct shape on a former.

Many rotors of medium and smaller sizes are wound with mush coils, similar to those already described for stators. The shape of this type of rotor coil differs, however, from that of stator coils, as the former should be made suitable for banding when the machine is wound. The general shape to which the coil is first wound is shown in fig. 43. When the coil is placed in the rotor its ends are formed by hand approximately to the shape of an involute, as this shape gives the completed winding the necessary amount of self-support and rigidity to make it suitable for banding. The important point in the design of these coils is to get the correct length of turn, that is, the correct perimeter for the centre block on which the coils are wound. Slight variations in the shape do not then matter, as the shape can easily be adjusted by hand when the coils are being placed in the machine. A method which the writer has found satisfactory for obtaining the correct lengths of coils is to plot a curve showing the relationship between $(P-2L)/D$ and T/S, where P is perimeter of centre block, L is length of core, D is diameter of rotor, T is the "throw" of the coil (1 and T + 1), and S is the number of slots. Such a curve, which will be found to approximate to a straight line, can be constructed for any particular make of machines from a few experimental windings, and will be found to be fairly reliable for all similar windings.

Accessories.

The accessories for a completed motor, which may perhaps with advantage be briefly mentioned here, are those for (1) reducing the wear and tear on the brush gear; and (2) protecting the brush gear and terminals of motors which are used in fiery mines, so that there shall be no possibility of gas being ignited by sparks from the motor.

A motor designed to fulfil this latter condition is illustrated in fig. 44. This was a motor supplied by the British Thomson-Houston Co. for operating a rope haulage in a Welsh colliery. It will be seen that the slip rings are enclosed in a strongly ribbed cast-iron cover which makes a flame-proof casing for the brush gear. This is fitted with an inspection cover so that the brushes are easily accessible for attention. Both stator and rotor are further fitted with trifurcating boxes in which the connections between motor terminals and three-core cable mains are enclosed. It will be seen that each trifurcating box is fitted on to the motor by a square flange, so that the box gland for the three-core cable may be turned in any of four directions.

The reduction in the wear on brush gear of motors which are intended for continuous running is effected by means of a brush lifting and short-circuiting gear. This device, which is generally operated by a handle on the collector case, enables the slip rings to be short-circuited and the brushes to be raised from them when the motor has started, so that so long as the motor is running the brush gear is out of operation altogether. When the machine is stopped a reverse operation brings the brushes back into position ready for re-starting. The brushes are, therefore, only in use for short periods, and the saving is such that the motor requires a very much smaller brush gear when fitted with this brush-lifting device. It would not, of course, be practicable to use this gear on motors for intermittent service, such as the machine just described.

In concluding these articles, the writer desires to record his thanks to the various firms whose machines have been illustrated for the photographs, &c., which have been reproduced, and his appreciation of their kind permission to publish them.

A Large Turbo-Generator. — The A. G. Brown, Boveri & Cie. has recently been building for the Municipal Electrical Works Mark, at Hagen, a turbo-generator of 29,500 KW. output. The floor-space required for this set in comparison with one having an output of 5,000 KW., at 3,000 R.P.M., is in the proportion of 2·6 : 1, so that six sets of 5,000 KW. each, or with a total output of 30,000 KW., would require about 2·3 times as large a space as this set alone. It is thus evident that it is considerably more economical to install such large units than several small ones, in view of the saving in cost of space, buildings, foundations, piping, &c.

The new set is designed for use with superheated steam at 350° C., at a pressure of 13·5 atmospheres and with surface condensation, the temperature of the cooling water being 12° C.

HIGH-SPEED ELECTRIC PASSENGER LOCOMOTIVE.

An interesting example of the way in which electric traction is being developed for passenger service in the United States is to be found in the group of sixteen locomotives which have been recently placed on high-speed main line passenger service by the New York Central and Hudson River Railroad Co. Fig. 1 illustrates one of these locomotives which is claimed to be the most powerful electric passenger locomotive thus far constructed. It is capable of continuously hauling a train of fourteen steel Pullman cars at a sustained speed of 60 miles per hour, while with a lighter train the maximum speed of these locomotives is 85 miles per hour. These speeds and capacities have been actually obtained in tests made both on the experimental track maintained by the railroad company west of Schenectady and on the electric division before the locomotives were put into commercial service.

The electrical features of these locomotives are generally the same as in the original electric locomotives first operated by the above company eight years ago. The principal change is in the mechanical arrangement of the wheels and trucks. In the first thirty-five locomotives there were four driving axles set in a rigid wheel base, and the guiding of the locomotive was accomplished by two-wheel pony trucks at each end. These original locomotives each weigh 100 tons, and are capable of hauling eight Pullman cars at a speed of 60 miles per hour. The next development was the placing of four-wheel bogie trucks at each end of the locomotive for the purpose of improving the riding qualities at high speeds. Of this class, twelve locomotives were built, and they weigh 122 tons each, their hauling capacity being about the same as that of the original locomotives.

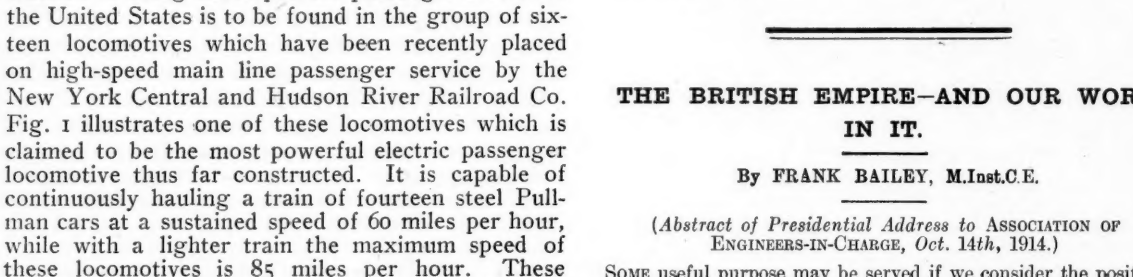


Fig. 1.—High-Speed Electric Locomotive, New York Central and Hudson River Railroad.

The new locomotives weigh 132 tons, and the great increase in capacity, compared with the slight increase in weight, is due to the fact that motors have been placed on the axles of the leading and trailing bogie truck wheels; thus there is no "dead" weight, all wheels being driving wheels, and the entire weight of the locomotive is available for producing tractive effort or draw bar pull. The acceptance tests recently conducted by the railroad company were very complete, and represented actual operating conditions. The trials were made with a fourteen-car train of the heaviest steel Pullman cars, and actual train schedules were carefully followed. Readings were taken to measure accurately the electric current used and to indicate precisely the speeds maintained. The results demonstrated with these locomotives exceeded the contract requirements and the current consumption was very low, probably the lowest yet attained in this class of service. Moreover, the riding qualities of these locomotives have been found to be excellent.

These locomotives are used in operating to a distance of forty miles outside the city of New York, and are capable of operating at long distances. We are indebted to the Chief Engineer of the New York Central and Hudson River Railroad Co. for the above particulars.

THE BRITISH EMPIRE—AND OUR WORK IN IT.

By FRANK BAILEY, M.Inst.C.E.

(*Abstract of Presidential Address to* Association of Engineers-in-Charge, *Oct. 14th*, 1914.)

Some useful purpose may be served if we consider the position of the engineer-in-charge, the possibilities of his profession, and the opportunities which occur, or which he may be able to create, to justify his claim to be a useful member of a great empire.

The work of maintaining plant or of superintending works of construction involves details of management, specialised experience, and therefore a knowledge of men and of many handicrafts. These requirements can be fulfilled satisfactorily only by the happy combination of theory, practice, and experience. Theory is useless for this purpose unless applied to practice; and practice becomes only a blind imitation of possibly obsolete methods unless controlled by theory. If practice were always perfect there would be no room for theory; and if theory were always correct and unlimited by considerations of practice, everything would be perfect with no room for improvements, and the engineer-in-charge would become merely a watch dog.

Theory cannot progress without bold flights of imagination stimulated by scientific research; then comes constructive effort and creative skill involving practical experience, and finally the verdict of success—more or less work for the engineer-in-charge.

If the theory has been correctly based on facts, verified or suggested by complete research and applied to practice by the best form of design and construction, it is possible that the engineer-in-charge may relieve the monotony of his existence by keeping things clean and pouring oil into the right place, confident that all is perfect and free from the possibilities of antiquation.

We like to believe that all sources of power in nature have been unfolded to us, but there may be possibilities of future discoveries beyond out present comprehension, and we know that the path of knowledge when industriously pursued inevitably leads to improvements in conception, design, and construction; sometimes amounting to revelations which humble our pride, and prove that our former satisfaction was merely ignorance. The possibilities therefore of initiating new methods, better design, improved processes, etc., should relieve the work of the engineer-in-charge from any tedious monotony, even if ordinary repairs and breakdowns or failures, which may appear mysterious in origin, do not absorb all his energies.

The position occupied by an engineer-in-charge must depend on his own efforts. If he is content to make no progress, or improvements on existing methods, and to make no real attempt to fully grasp the requirements of the plant under his charge, he is not likely to increase the earning power of a factory by securing a larger output or an increased profit by working at a higher efficiency. If, however, a determined effort is made to secure a comprehensive grasp of the main principles of his work, coupled with a special knowledge of the smallest detail of the process of manufacture, he is able to apply skilled judgment on the performance of his plant and to suggest and carry out improvements, or to advise on the replacement of the plant. The necessary courage to condemn

plant is not easily acquired, as this courage must subsequently be justified by performance verifying promise. The asset value of the scrap heap will not atone for only a partial success of the improved plant, hence the engineer must be prepared to accept the full responsibility of his advice, and be blamed for any defects; in any case, he must not expect praise, for if the replacement exceeds expectations he may have to explain why such an obvious improvement did not receive earlier attention.

If improvement in process or plant results in profitable expansion of output, the wealth of the nation must be increased, and the engineer-in-charge will occupy a recognised position, even in a humble capacity, as a worthy member of the Empire.

Expansion of output is necessary not only to meet the ever-increasing needs of the Empire, but also of the open markets of the world, and the demand on this output will increase as the cost of production is reduced. We must admit that low cost of production, combined with excellence of quality, constitutes the strongest weapon against competition; the persuasive eloquence of the salesman may assist, but the initiation of improvements in manufacture should be part of the life work of the engineer.

The weakest link in our chain of progress appears to be the method of ascertaining the right way of going to work; sometimes it is achieved by actual experience, or, in other words, by trial and error, but rarely by systematic examination. In such an investigation the services of the chemist are generally of great value, although they are seldom appreciated except in chemical factories. Industrial chemistry can assist the engineer by defining the composition of substances, and when combined with some knowledge of engineering requirements the advice of the chemist is a good investment. In this matter the industrial chemist, with a slight knowledge of mechanical engineering, is capable of giving better assistance than the engineer with a rudimentary knowledge of chemistry; but it is essential that the engineer should place implicit faith in the chemist, and adopt the whole of his advice, as otherwise a partial remedy may introduce new troubles.

In the selection of metals or alloys for particular work the chemist can specify the most suitable material, and in the case of steel very small quantities of impurities exercise such an important effect that chemical analysis should be made on samples of the steel as delivered. If, for example, we are working with mild steel the presence of even 0.05 per cent. of phosphorus would be injurious; and with nickel steel the addition of about 3 per cent. of nickel is sufficient for armour plate and guns, and for railway tires and projectiles the addition of an equally small amount of chromium is sufficient.

For brass, bronze, gun-metal, and white metal, the expert assistance of the analytical chemist is most valuable. Many bearings of high-speed machinery give trouble owing to the use of metal which drags, shrinks, or cracks, and is therefore defective for this purpose.

In the selection and use of lubricating oils we have to consider not only the flash point but also the purity of the oil, as any liability to oxidise thickens the oil, thus increasing its viscosity and the temperature of bearings, and in circulating oil systems it is sometimes difficult to prevent the oil from mixing with a certain amount of moisture, thus increasing the risk of oxidisation, and when any fatty oil is present the resulting decomposition releases fatty acids which are highly corrosive.

All this provides useful work for the chemist, in addition to the usual tests on water and fuel, in cases where a factory has the misfortune to be placed somewhere away from a supply of electrical energy.

In large power works the chemist can specialise on important problems which frequently threaten to defeat the skill of the engineer, such as dissolved oxygen in condensed water, due to aeration by condenser pumping gear, causing excessive corrosion; also deposits on turbine blades; both these problems appearing especially under modern conditions of high steam pressures.

Before leaving this inadequate appreciation of the work of the industrial chemist some mention should be made of the discouragement caused to some industries by the action of the Excise Authorities in restricting the supply of methylated absolute alcohol. The ordinary oilshop article contains, in addition to 10 per cent. wood spirit, from 5 per cent to 10 per cent. paraffin oil to render it unpalatable. The paraffin cannot be removed by any simple process, and its presence is very detrimental for many purposes. Up to about the year 1870 methylated absolute alcohol, without the addition of heavy or viscuous petroleum, could be freely obtained without irritating restrictions, and much valuable work was carried out by technical experimentalists, particularly in fine coal-tar products, aniline colours, etc., but any hope that these industries would become part of our national trade was ruined by the mineralising of methylated spirit. We can only envy other nations who are free from these vexatious restrictions, and must expect to find that they will develop the use of alcohol for motor traction purposes, while we are grumbling at the action of our Excise Authorities.

It may be urged that engineers-in-charge ought not to bother themselves about chemical work, but wait until the perfecting of any process reduces the work of the manufacturer to mechanical repetition. This suggestion implies that man, gifted with intelligence and the ability to think, should be content to remain a machine of beef and muscle and probably be guilty of a crime against tradition if he suggested any improvement. A pernicious doctrine of this kind cannot be beneficial to the members of this Association, or to the welfare of the country, and it would be better to risk incurring the ridicule and displeasure of those who prefer stagnation than to perpetuate antiquated or obsolete methods. So much information can be obtained by simple means of investigation that it is surprising how little encouragement is given by many business firms to practical research, or even in assisting their technical officers to collect information from kindred industries either at home or abroad.

Assuming that we have improved our plant and methods there are other matters of domestic interest which require attention. Prosperity generally creates trade disputes, labour unrest, and possibly strikes. We deplore war between nations as a crime against civilisation, and in a lesser degree we must feel that something is wrong when labour declares war against capital, and refuses to work, or to allow work to be done, with the resulting penalty of poverty and consequent privation and misery to women and children. Engineers-in-charge may find in the solution of this problem a task worthy of their efforts. The skilled workman or the labourer is understood and appreciated by them, and when a claim for consideration receives a refusal, that refusal becomes a grievance soon magnified into a dispute, with ill-will and bitter feelings culminating in the senseless coercion of strikes. Some of our Colonies have had experience in the statutory suppression of strikes, and probably the most successful result has been obtained in Canada, under their Industrial Disputes Investigation Act of 1907, which provides for arbitration under facilities favourable to conciliation.

Legislation has also frequently been suggested to provide for the compulsory examination and certification of those in charge of steam boilers, etc., on land. Probably the general use of electrical power has now made this question of less interest as affecting the safety of life; but as a matter of national importance any proposal which secures encouragement for efficiency, or an incentive to progress, is worthy of serious consideration. In our marine service certificates are granted by the Board of Trade after examination, but on land the only statutory provision is contained in the Boiler Explosion Acts of 1882 and 1890, which provide for an inquiry by the Board of Trade into the cause of any accident in connection with the use of steam or explosion of steam boilers. In these inquiries it is assumed that reasonable care should be exercised in placing steam boilers, etc., under the control of qualified and competent attendants, and that the design and manufacture of steam appliances have received proper attention.

It is not clear that examination and certification of engine drivers and stokers would enable the Board of Trade to report in favour of any alteration in the present procedure, and it is probable that many competent attendants would have difficulty in passing such examination.

It is more reasonable to expect that membership of this Association would be accepted as the necessary qualification of those in charge, and as a guarantee that they can be trusted to select competent attendants for steam plants.

A TRANSMISSION SYSTEM SUITABLE FOR HEAVY INTERNAL-COMBUSTION LOCOMOTIVES.

By HEDLEY J. THOMSON, M.I.E.E.

(*Abstract of paper read before the* British Association, *August*, 1914.)

A considerable portion of this paper is devoted to an investigation of the operation of the Thomas transmission system, which was illustrated and described in the Electrical Review, May 5th and June 23rd, 1911, and has subsequently been referred to.

The Thomas transmission is an electro-mechanical system, comprising :—

(*a*) A planetary casing in which are mounted duplex pinions of different diameters, one meshing with a large and the other with a small sun wheel (mounted respectively on the "load" and "auxiliary" shafts), the casing and the two sun wheels forming three independent members of a differential planetary gear.

(*b*) Two electrical machines, one driving or driven by each of the shafts on which the sun wheels are mounted.

(*c*) An electrical controller, by which the electrical condition of the two electrical machines can be varied at will.

In practice the planetary casing is driven by the prime mover ; by first taking power from the auxiliary shaft, and, later, by putting power into it, its speed can be varied, with the result that the load shaft speed varies from zero up to the speed of the prime mover.

This object is secured by utilising the torque on the auxiliary shaft to drive an electrical generator, the current from which is taken to a motor on the load shaft. By means of field control, first of the generator, and subsequently of the motor, the speed of the load shaft (attached to the motor) is varied from zero to the inter-

mediate mechanical ("intermec") speed—the generator field and armature being then short-circuited and the armature revolving slowly backwards due to the gearing.

At this point the electrical functions of the two machines are reversed; the motor, now a generator, energises the other machine, reverses its direction of rotation so that it runs in the same direction as the engine, and through the gearing gradually increases the speed of the first machine and load shaft until a stage is reached when all three members of the system attain the same speed, when any two of them may be coupled together; after which the generator field can be again weakened until its voltage falls below the back E.M.F. of the motor, when the current will die to zero.

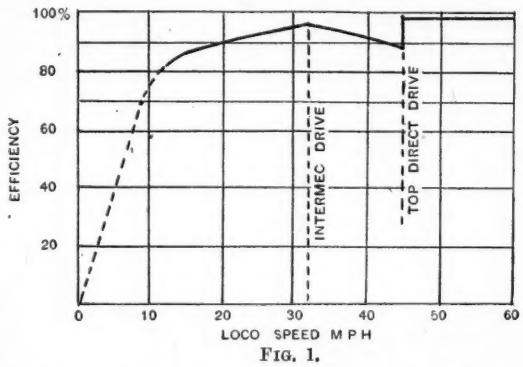


FIG. 1.

The power dealt with in the electrical system is a maximum when the load shaft is rotating at a slow speed. It gradually decreases to almost zero at the "intermec" speed, after which it again gradually increases until the top electro-mechanical speed is reached, when the power dealt with electrically seldom exceeds one-half of the total power developed by the prime mover. This speed is not a running speed, but a temporary speed introduced with the object of bringing all three members of the planetary system to a common speed, when by a mechanical coupling together of any two of them, and proper manipulation of the fields, the electrical transmission is eliminated, and thenceforward the power is transmitted solely mechanically, while the planetary system and gears rotate with no relative motion.

A measure of the extent of the departure of the system from an ideal variable speed torque transformer will be found in the losses in the gearing and bearings, in windage and in the two electrical machines and controller, the only possible avenues for the dissipation of energy in the system. The losses in the gearing are a maximum when starting, because there is then a maximum relative movement between the gears, but under no conditions with properly made gears should these exceed 6 per cent. As the load shaft speed increases, the relative motion in the gearing gradually becomes less and less, until finally it reaches zero, when the "top direct" drive is reached. Losses in the electrical machines are a maximum also for the first few controller positions, but, as the load shaft speed increases, so the auxiliary shaft speed decreases, a change accompanied by a corresponding decrease in the amount of power dealt with by the electrical system. At the "intermec" speed the total electrical losses are of the order of 4 per cent. After passing this speed they begin to increase again, and, if it were not for the introduction of the "top direct" drive, they might become serious.

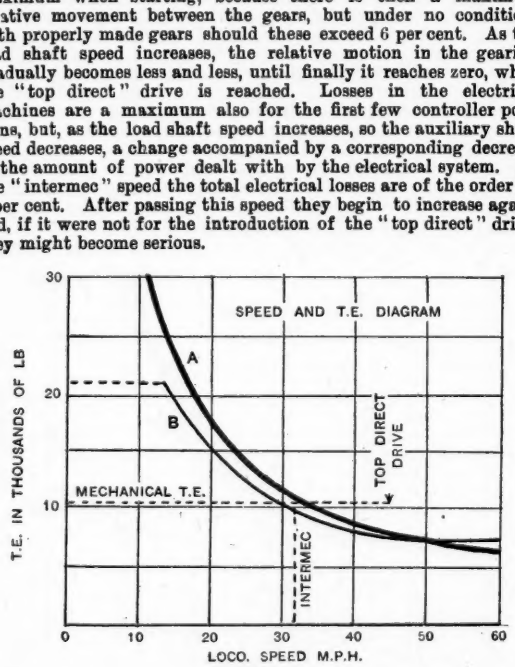


FIG. 2.

Fig. 1 shows the characteristics of the efficiency curve obtainable with this system. It will be seen that for a very considerable range on each side of the "intermec" drive the efficiency is practically as high as might be obtained from fixed reduction gear, and yet, throughout the whole variable range of the apparatus there is as much flexibility as would be available from a much more costly, heavy, and less efficient purely electrical installation.

Important features of the system are well shown by fig. 2, which is a tractive effort diagram set out along lines familiar to railway engineers. The case taken is that of a locomotive equipped with two engines, each capable of developing 500 H.P. at 550 revolutions. The curve A is the characteristic curve for 936 H.P., the total power delivered by the engines at the normal speed of 515 revolutions. Immediately below curve A is curve B, showing the tractive effort that would be delivered at the driving wheels if there were no gearing or bearing losses in the final drive to the axles. The difference between the ordinates of these two curves, therefore, indicates the losses at any given speed, due solely to the Thomas transmission. It will be seen that a horizontal line has been drawn parallel with the base from a point corresponding with a tractive effort of 10,500 lb., and that it cuts the tractive effort curve B at a point corresponding with the "intermec" speed. This horizontal line represents the constant tractive effort derived mechanically from the large sun wheel of the planetary gearing. That part of any ordinate of the tractive effort curve above this line is a measure of the tractive effort obtained by electrical means. It will be seen that this addition has a maximum value at starting, and that at a point corresponding with 14 miles per hour it begins to decrease and reaches zero at the "intermec" speed; also that after that speed the effective tractive effort is gradually diminished, due to the amount of power circulated electrically, till at a speed of 45 miles per hour the "top direct" drive clutch is operated and the electro-mechanical drive cut-out altogether, when the final tractive effort becomes at once that due to the engines alone. When running in direct drive further variation of the locomotive speed is possible by simple throttle variation, and by this means the locomotive now under consideration might be run up to close upon 70 miles per hour for short periods, provided the engines could be run at speeds approaching 700 R.P.M.

From the point of view of the traction engineer two important features of the system are:—

1. That for practically all running speeds below the top direct drive the losses in the transmission are small, because such a large proportion of the power is transmitted mechanically.

2. That if the power of the prime mover be correctly chosen the direct drive can be in use and the electrical losses altogether eliminated during the greater portion of the running time.

The special value of the first feature is that the speed on grades approaches the maximum possible with the power available.

The second feature, on the other hand, has a very marked effect on the overall economy, as can be easily gathered from the fact that under general passenger locomotive conditions for well over 90 per cent. of the total running time it will be possible to utilise the direct drive, and during the remaining 10 per cent. of the running time the losses in the Thomas gear will not, on an average, exceed 10 per cent. of the power dealt with.

It is worth while here comparing these losses with those that would have to be allowed for in a pure electric transmission system in which the total power of the prime mover is transformed by means of a generator into either direct or alternating current and delivered by cables to motors on or driving the wheels. With such a system, when runnning even with full load, the overall electrical efficiency will seldom exceed 80 per cent., and when running on the level at high speed; but, as would normally be the case, at about two-thirds load it will probably be often as low as 65 per cent. Further, when running on steep grades with increased current to provide increased tractive effort, the efficiency will be still lower.

But, quite apart from the important question of speed on grades and overall economy, electrical machines that have to deal with the whole power for considerable periods, and with a large proportion of it continuously, are necessarily large, heavy and costly if the power dealt with is large. With the Thomas electro-mechanical system, since the electrical units never deal with more than a portion of the total power, and even then are in operation only for short periods (*i.e.*, only when starting and when on steep grades) they can be small as compared with the power of the prime mover without risk of their overheating. Thus, instead of 500-H.P. machines being necessary, machines of approximately 90-H.P. continuous rating would be sufficient with this system as applied to the locomotive just referred to.

The rapid development of the internal-combustion engine and the enormous advances that have been made recently in the manufacture of high-power gearing that will run continuously at the high speeds and pressures called for in marine turbine reduction gearing, coupled with the years of experience gained in electric traction, have at last opened up the way for the application of such a system as that described to heavy rail traction. With the help of the progress thus made in other fields of engineering, every one of the essential features of the powerful internal-combustion locomotive of the future can be embodied in a practical locomotive which will have many points in its favour as compared with the steam locomotive, even in countries where the supply of coal and water is not the serious question that it must be in many parts of Australia.

Lowering Fly-wheel into Pit.—Installing a large Corliss engine in an out-of-way place, with but few tools, is a trying ordeal. I know it. A few pinch bars and a jack borrowed from a section boss constituted the entire equipment. All went fairly well until it came to lowering the one-piece fly-wheel into the pit. It occurred to me to fill the pit partly with dry sand. Then the wheel was rolled down easily and the shaft put into it. On digging the sand out the wheel settled down until the shaft rested in the bearings.—PHILIP R. DUNTON, in *Power*.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY *cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.*

Street Lighting in Chicago.

With reference to the extract from the *Electrical Review and Western Electrician* appearing on page 504 of your issue of the 9th inst., giving an account of the street lighting in Chicago, we would state that it is most misleading.

The article mentions that the maximum candle-power of the 450-watt flame lamp is only 1,150 by laboratory test, whereas a modern flame lamp would give a maximum candle-power of about 4,000, and the deposit on the inside of the globes would be practically *nil*, even after 300 hours' burning.

It is stated that an average maximum of 600 C.P. would be obtained from each 300-watt nitrogen-filled tungsten lamp, but surely this is incorrect, as there must be *some* loss from "Alba" enclosing globes even before they become dusty or dirty.

Again, the claim of 600-C.P. for 300 watts is also incorrect, for in no cases where practical tests have been made of so-called "half-watt" lamps has the candle-power been two candles per watt. "Half-watt" is therefore a misnomer, and most misleading to the public, as they will very soon find out when the accounts for electricity consumed come in.

We believe that in Chicago both enclosed flame and magnetite lamps are employed, and neither of these can be called an efficient lamp in any way for street lighting.

It seems to us that the municipal authorities of Chicago are taking a retrograde step in introducing metal-filament lamps for street lighting; possibly the reason for this is there is no efficient flame arc lamp made in the U.S.A. Changes in street lighting in Chicago, we hear, are numerous, and therefore we hope to hear before another year or two has passed that the authorities have discovered a flame lamp which is as efficient as the best productions of this country, and will again revert to flame arc lamp lighting, and, by so doing, adopt a forward policy.

Per pro. **Engineering and Arc Lamps, Ltd.**
WM. M. D. PELL, *Director.*

London, E.C., *October 23rd*, 1914.

The Trade War.

With reference to your leader and notes about your canvass of the home manufacturers, I am glad to see that there is some tendency to start the trade war by beginning where the enemy's pitch met ours in peace time, almost as I suggested in my letter in your issue for September 11th. If I may have a further say in this matter, may I point out that as nearly all the home manufacturers have either branches, agents, or other connections in either the Colonies or South or Central America, it would only be a matter of about six or eight weeks to collect statistics relating to Austro-German electric imports, and from these plan the 1915 output of goods and the necessary advertisement and publicity literature. As a man who has either travelled or lived in France, Belgium, Austria, Germany, Spain, Turkey, Russia and the U.S.A., and who has worked for three different trade associations (one of them an American), I would suggest that after receiving the particulars relating to the overseas business territory, and reviewing the same, the makers here should only reckon to capture from 30 to 50 per cent. of the abandoned enemy business, as this would allow for competition and the activity of the American makers in the particular localities.

Against your suggestion of a Royal Commission on the subject, may I urge that in the main individual effort will only succeed in securing an acceptable percentage of the abandoned enemy trade? Royal Commissions and most of the deliberations of Trade Associations are nothing short of horrors to the man who knows his job and wants to get on with it. Besides, the former are always collections of gentlemen who generally succeed in spending anything between £15,000 and £30,000 incomplimenting each other for a few hours per day for a period covering, perhaps, several months, and then conclude by arriving at decisions which are about 14 years out of date. Further, in the present instance the war will most likely be over by mid-winter, and be it empire or republic, Germany will rapidly rise again, so that six months' deliberation would, in my opinion, be fatal.

As Mr. Coates half suggested in your previous issue, I have found that the man who has been outside the British Isles would sooner take German or American money, as it is generally earned under more agreeable conditions than British remuneration, and there is an element of friendly generosity in the payments which always enthused me to further activity. This is good from both points of view, *i.e.*, the employer and employed—and in respect of the former lays the foundation of future business. These conditions are seldom found—never in my experience—in British industries, and I have sampled the rubber, petrol motor, technical journalism and electrical businesses in my time. I quite endorse the objectionable inter-departmental note item mentioned by Mr. Coates, as while in charge of a small department I frequently found notes on my desk from a higher (?) authority which would have been an insult to an office boy. Another apology for a "boss" would sign almost anything that a certain female typist put before him, provided the matter was detrimental to my department or offensive to myself. Another unique experience, although I had been used to slim treatment in three other industries, arose on my accepting a post at a moderate salary on account of the sudden death of an American partner of mine. Although one of the firm expressed doubt as to whether the new branch could be worked at all—the work was little short of slavery—the salary at which I was engaged was reduced by 15s. a week because I could not run the affair without additional staff. After being assured that the matter would be adjusted "after Christmas" and an advance on my original allowance made, I got an "advance" of 5s. a week on the 15s. a week arrears which had been piling up since the previous October, and this after a certain notable had pointed out at the official dinner the previous evening that "the prosperity of the industry was inseparably bound up with the prosperity of the employés." In the light of this, which is not unusual at home, even the most embryonic intellect can well imagine that many of us do not look to the home industries for either congenial or remunerative employment.

Arthur Mallord Turner.

Wimbledon, *October 26th*, 1914.

I was recently connected with a company promoted to push the sales, and protect the interests generally, of British manufacturers in Morocco, and while the requisite number of agencies have now been secured, it surprised me to see the slowness with which manufacturers made the best of an excellent opportunity to increase their business.

If the United Kingdom is to secure an appreciable share of the business which for the moment is lost to Germany and Austria, much less retain it after peace is declared, we must not sit down wrapped up in the idea that, with Germany and Austria out of the market, orders will simply find their way into the factory letter-box. The United States and other neutral countries are making every possible effort to reap the benefit of the present opportunity to replace German and Austrian goods, and it behoves British manufacturers, agents and merchants, to do likewise.

I shall be very pleased to place manufacturers and others in touch with a progressive London export house, who know the Egyptian and Sudan markets thoroughly, and who are determined to make the best of the present situation by sending out a representative to Egypt and the Sudan, and also to Aden and Massowah.

Leonard E. Boxall.

London, E.C., *October 26th*, 1914.

Commutator Bars.

Can any of your readers aid me in the securing of commutator segments or commutator bars, or give me the names of any firms in Great Britain or friendly countries who satisfactorily supply them?

Arthur Bergtheil, M.I.E.E.

London, E.C., *October 23rd*, 1914.

Armorduct v. Defries.

In view of the publicity which has been given by you and other journals to the decision which was given by Judge Atherley Jones in the City of London Court recently, I think it desirable and necessary that I should state certain facts which have an important bearing on the matter.

These facts are :—

(*a*) Immediately on the issue of the Royal Proclamation forbidding payments to alien enemies, we gave verbal and written instructions to our bankers to refuse the payment of all bills of exchange which were issued by us to alien enemies before the declaration of war, and in the case of one bill which was presented we refused payment and reacceptance in spite of the fact that the holders, the London Joint Stock Bank, professed to be "holders for value." Being threatened with legal proceedings by them we submitted the matter to counsel, and upon his advice we reaccepted this bill, which, however, has not been presented for payment since. We also instructed our bankers to refuse the payment of a large cheque which, in the ordinary way of business, we had paid to certain German suppliers some days before the declaration of war. We have, in other words, not remitted one single penny to alien enemies since the outbreak of the war, we have no intention of making any such payment, and we shall in due course supply proof of our absolute *bona fides* in this direction.

(*b*) We, on the other hand, have paid all our ordinary liabilities, apart from liabilities to alien enemies, as they became due, and we have every intention of continuing to do so, and we may say we have ample funds in hand for the purpose.

(*c*) Our business is now practically limited to our own manufactures, apart from which, however, we continue to handle on a large scale certain goods which we purchase, and always have purchased, in this country.

(*d*) We manufacture, and have for approximately seven or eight years manufactured, on a substantial scale at Bathurst Works, Witton, Birmingham.

(*e*) By far and away the largest amount of the capital engaged in our business is invested in these works, the lock-up approximating £50,000.

(*f*) We continue to employ a substantial number of hands at Bathurst Works, Witton, and have in hand large Government contracts, the most important of which cover goods which we do not manufacture in the ordinary way; we have taken these contracts in order to keep our staff and workmen together.

(*g*) Approximately 40 of our employés are with the Colours—their positions are kept open for them with a view to reinstatement on the conclusion of hostilities.

(*h*) There is not a single alien enemy in our employment. ¶ (The writer is a naturalised subject of some years' standing.)

If these facts are confronted with the judgment referred to above, the obvious unfairness and absurdity of the situation will be apparent.

W. Schmahl, *Managing Director.*

London, E.C., *October 26th*, 1914.

TRADE STATISTICS OF NEWFOUNDLAND

THE following figures, showing the imports into Newfoundland during 1912-13 of goods which are of interest to electrical contractors, are extracted from the recently issued trade statistics. The figures for 1911-12 are added for purposes of comparison, and notes are given of any increases or decreases.

Dollar = 4s. 2d.

	1911-12. Dols.	1912-13. Dols.	Inc. or dec. Dols.
Belting.—			
From United Kingdom ...	1,000	4,000	+ 3,000
,, Canada	1,000	6,000	+ 5,000
,, United States ...	12,000	11,000	− 1,000
Total	14,000	21,000	+ 7,000
Gutta Percha manufactures.—			
From United Kingdom ...	19,000	21,000	+ 2,000
,, Canada	59,000	48,000	− 11,000
,, United States ...	59,000	66,000	+ 7,000
Total	137,000	135,000	− 2,000
Iron and steel railway bars and fittings.—			
From United Kingdom ...	2,000	—	− 2,000
,, Canada	2,000	5,000	+ 3,000
,, United States ...	3,000	3,000	—
,, Other countries ...	—	1,000	+ 1,000
Total	7,000	9,000	+ 2,000
Radiators, electric light material, etc.—			
From United Kingdom ...	24,000	31,000	+ 7,000
,, Canada	8,000	8,000	—
,, United States ...	36,000	64,000	+ 28,000
Germany	—	1,000	+ 1,000
,, Other countries ...	—	1,000	+ 1,000
Total	68,000	105,000	+ 37,000
Machinery for mining purposes.—			
From United Kingdom ...	44,000	34,000	− 10,000
,, Canada	148,000	267,000	+ 119,000
,, United States ...	58,000	92,000	+ 34,000
Total	250,000	396,000	+ 146,000
Machinery for local industries.—			
From United Kingdom ...	4,000	3,000	− 1,000
,, Germany	—	4,000	+ 4,000
,, Canada	5,000	2,000	− 3,000
,, United States ...	16,000	8,000	− 8,000
Total	25,000	17,000	− 8,000
Materials for Western Union Telegraph Co.—			
From United Kingdom ...	1,000	4,000	+ 3,000
,, United States ...	—	1,000	+ 1,000
Total	1,000	5,000	+ 4,000
Material for Direct U.S. Cable Co.—			
From United Kingdom ...	1,000	500	− 500
,, Other countries ...	—	500	+ 500
Total	1,000	1,000	—
Goods for Anglo-American Telegraph Co.—			
From United Kingdom ...	1,000	3,000	+ 2,000
,, United States ...	2,000	1,000	− 1,000
Total	3,000	4,000	+ 1,000
Scientific instruments.—			
From United Kingdom ...	1,000	500	− 500
,, United States ...	1,000	1,000	—
Total	2,000	1,500	− 500
Materials for wireless telegraphy.—			
From United Kingdom ...	4,000	1,000	− 3,000
,, United States ...	—	2,000	+ 2,000
Total	4,000	3,000	− 1,000

NEW PATENTS APPLIED FOR, 1914.

(NOT YET PUBLISHED).

Compiled expressly for this journal by MESSRS. W. P. THOMPSON & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

20,875. "Process for the production of nickel-coated sheets." S. O. COWPER-COLES. October 12th.

20,876. "Process for the recovery of tin from tinned iron and the like." S. O. COWPER-COLES. October 12th.

20,896. "Electric automatic tumbler switches." H. C. HEATH & J. P. KEITH. October 13th

20,906. "Apparatus for magnetizing permanent magnets." S. C. NEWTON. October 13th. (Addition to 24,327/13.)

20,908. "Arrangements for synchronizing apparatus having similar periodic movements." W. P. THOMPSON (Soc. Anon. des Telegraphes Edouard Belin, France). (Complete.) October 13th.

20,924. "Apparatus for use in the recovery of tin from tinned iron scrap and the like." S. O. COWPER-COLES. October 13th.

20,925. "Process for the production of rustless nickel-coated sheets and the like." S. O. COWPER-COLES. October 13th.

20,927. "Electro-magnetic switch." ROBERT BOSCH (firm of). October 13th. (Convention date, June 8th, 1914, Germany.) (Complete.)

20,931. "Electrical batteries." F. R. MARSHALL. October 13th.

20,958. "Automatic electric fuse." O. JOHNSON. October 14th. (Complete.)

20,959. "High-tension windings for electrical apparatus." W. H. WILSON & F. W. WRIGHT. October 14th.

20,999. "Interchangeable bioscope arc-lamp carbon-saving attachment for direct current and for alternating current." L. HUGHES. October 15th. (Complete.)

21,009. "Ignition devices for explosion engines." A. H. MIDGLEY & C. A. VANDERVELL. October 15th.

21,012. "Process for the recovery of tin from its ores." S. O. COWPER-COLES. October 15th.

21,033. "Automatic contact mine detractor bowsprit." S. R. D. MUNDY. October 15th.

21,042. "Multiple point control electric light switch." E. W. C. KEARNEY. October 16th.

21,046. "Magnetic lock for miners' lamps." J. DAVIS & SON (DERBY), LTD., & W. H. DAVIS. October 16th.

21,079. "Electrically-heated boiling or cooking plates." R. DOWNE & W. TRAVIS. October 16th. (Complete.)

21,083. "Joints for pipes and electrical conduits." J. S. ENRIGHT. October 16th.

21,090. "Electro-magnetic perforators." E. THOMSON. October 16th. (Complete.)

21,096. "Alternating electric current circuits in which condensers are employed." BRITISH INSULATED & HELSBY CABLES, LTD., and H. HIGHAM. October 17th.

21,143. "Electrically-actuated tools." W. J. MELLERSH-JACKSON (Commonwealth Electric Tool Co., United States). October 17th. (Complete.)

21,145. "Electrically-actuated tools." W. J. MELLERSH-JACKSON (Commonwealth Electric Tool Co., United States). October 17th. (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of MESSRS. W. P. THOMPSON & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1913.

21,931. SELECTING DEVICE FOR ELECTRIC BELLS AND THE LIKE. W. E. Muntz. September 29th.

22,023. METHOD OF AND MEANS FOR MOUNTING ELECTRICAL RESISTANCES ON TO SUPPORTS FOR ELECTRIC APPARATUS SUCH AS HEATERS AND LAMPS. C. O. Bastian. September 30th.

22,024. ELECTRIC GLOW LAMPS. C. O. Bastian. September 30th.

22,224. ELECTRIC-PNEUMATIC AIR-BRAKE SYSTEMS. British Thomson-Houston Co. (General Electric Co.) October 2nd.

22,246. DRIVING OF ROAD VEHICLES. The Thomas Transmission, Ltd., and J. G. P. Thomas. October 2nd.

22,348. METHOD OF AND APPARATUS FOR THE CONTROL OF ELECTRIC SUPPLY PLANT. H. J. Read and W. J. Bransom. October 3rd.

22,394. ALTERNATING CURRENT TRANSFORMERS. D. K. Morris, Morris & Lister, Ltd., & J. P. Cateaux. October 4th.

22,405. LAMP ANNUNCIATORS FOR TELEPHONE SWITCHBOARDS. Western Electric Co., G. N. Nash, & B. B. Grace. October 4th.

23,333. MEANS FOR INDICATING DEFLECTIONS OF RAILS OR BEAMS WHEN SUBJECTED TO TRANSVERSE STRESS. W. R. Sykes Interlocking Signal Co. & R. W. Tarrant. October 15th.

28,915. ELECTRIC LAMP HOLDERS. A. H Brackensieck. December 15th.

1914.

4,294. ELECTRIC HOISTS, CRANES, WINCHES, AND THE LIKE. D. Wilson. February 19th.

6,953. ELECTRICAL RELAY APPARATUS. J. Gardner. March 19th.

8,456. COMBINATION ELECTRIC SWITCH AND FUSE. A. H. Short. April 3rd.

10,415. ELECTRIC RESISTANCE FURNACES. J. Davies & A. Gallenkemp & Co. April 27th.

10,480. ELECTRO-MECHANICAL STARTING GEAR FOR INTERNAL-COMBUSTION ENGINES. J. A. Boursin. April 28th. (May 22nd, 1913.)

13,567. INTERCOMMUNICATION TELEPHONE SYSTEMS. British L. M. Ericsson Manufacturing Co. & A. Brookes. June 4th. (Addition to 22,253/12.)